

THE
AMERICAN JOURNAL
OF
PHARMACY.

APRIL, 1836.

ORIGINAL COMMUNICATIONS.

ART. I.—ON SYMPLOCARPUS FÆTIDUS. By JOSEPH M. TURNER.

(Extract from Inaugural Thesis.)

Nat. Ord. AROIDEÆ.

Sex. Syst. TETRANDIA MONOGYNIA.

SYMPLOCARPUS. *Spatha*, ventricose-ovate, acuminate. *Spadix* roundish, covered with hermaphrodite flowers. *Calyx*, deeply four-parted, persistent, segments cucullate, truncate, becoming thick and spongy. *Petals*, none. *Style* pyramidal, four-sided; *stigma*, simple, minute. *Seeds*, solitary, immersed in the spongy receptacle.—NUTTALL.

S. fætidus. *Root* verticillately fibrous, truncate. *Leaves* smooth and green, ovate-cordate, enlarging, protected by large, glaucous, spathulate-linguiform, veinless bractes. *Spatha* ovoid, roundish, cucullate, obliquely acuminate, point coarctate, plaited, involutely auriculate at base, thick and spongy, livid purple, blotched and spotted with pale green. *Spadix* pedunculate, simple, almost spherical. *Bractes*, none. *Flowers* tessellately imbricate, adnate. *Calyx*, four-parted, divided to the base, segments cucullate, compressed at the apex, emarginated, at length becoming very thick. *Petals*, none. *Stamina*, four, opposite the divisions of the calyx; filaments subulate flat; anthers exserted, short, oblong-oval, two-celled; *Germ*, immersed, one-seeded. *Seed* naked, large, round, inclosed in the common receptacle. *Corculum* small, involute, erect, umbilicately attached to a large, solid, carneous perisperm.—NUTTALL.

Synon. *Arum Americanum betæ folio.* Catesb. Carol.

Calla aquatilis odore alii vehemente prædita. Gron. Virg. 186.

Dracontium fætidum. Lin. Sp. Pl. 1372. Willd. Sp. Pl. 2. p. 288, &c.

Pothos fœtida. Ait. Hort. Kew. 3. p. 319. Pursh. Flor. Am. Bot. 2. p. 398, &c.

Pothos putorii. B. S. Barton. Fl. Virg. Gron.

Symplocarpus fœtidus. Salisbury. Nuttall. Gen. 1. p. 107. Barton. Mat. Med. U. S. 1. p. 123. Beck. Bot. Northern and Mid. States, 382, &c.

Ictodes fœtidus. Bigelow. Mat. Med. ii. 41.

Icon. Thornton illus. Catesb. Carol. 2. t. 71. Bot. Mag. 836. Barton. Mat. Med. U. S. 1. t. 10.

Common names. Skunk cabbage. Skunk weed. Polecat weed. Rich weed. Itch weed.

Pharm. Dracontium. U. S. Pharm.

Offic. Radix.

Description.—*Symplocarpus* is an indigenous, perennial plant, growing very abundantly throughout all the northern section of the United States, in swamps, low meadow grounds, and on the borders of rivulets, delighting greatly in the shade and moisture.

It has caused no little confusion among botanists to arrange this plant, by some being considered as belonging to the genus *Pothos*, and by others, to *Dracontium*, but by most American botanists it has been erected into a new genus, which Mr. NUTTALL calls *Symplocarpus*, after SALISBURY.

This singular plant flowers very early in the season, and may be found as early as February. The flowers are arranged in a globose receptacle, and enveloped in a spathe, beautifully speckled with red, purple, blue, green and yellow; which completely hides the flowers from the inattentive observer.

It may be easily recognized after flowering, by its fine large, bright green leaves, which being all radical, resemble some species of cabbage, at distant view; and also by its very rank and offensive smell when broken, which resembles the odour of garlic and assafœtida combined; or, as its vulgar name would indicate, that offensive animal, the skunk.

All parts of the plant are strongly imbued with this rank odour; but the roots and seeds only are used in medicine.

The root, as generally seen in the shops, consists of the caudex and fibres; the former, when whole, of a cylindrical form, from two to six inches in length, and from one to one

and a half inches in diameter; of a dark brown colour externally, and very rough from the insertion of the radicles; internally of a white, starchy appearance; when cut transversely it shows a medullary portion which is less compact, more of an amylaceous aspect, and shrinks more from drying than the cortical portion.

The radicles are of a much lighter colour than the caudex, about the thickness of a goose quill, and when dried, very much wrinkled; internally of a white colour, with a yellowish brown epidermis; they do not possess the acrid principles of the plant to the same degree as the body of the root, and in fact the specimens which were collected in the fall had scarcely any acidity in them, for which reason they were thrown aside, the caudex alone being used in all the following experiments.

The roots on which these experiments were made, were dug up in the fall after the decay of the leaves, the radicles were cut off, the caudex well rubbed with a soft brush to free it from all foreign matter, then wiped dry with a cloth, and immediately cut into transverse slices about one-fourth of an inch in thickness; then spread out on hair sieves and dried in a well ventilated room; when dry it possessed the fœtid odour, and acrid properties in a high degree; at the time, I thought it had not lost much of its powers by the process, and flattered myself that its active principles might not be as volatile as its family relatives, the *Arum triphyllum*, &c. &c.; but these surmises, as the following experiments will tend to prove, were erroneous.

The decoction of the dried root was, when warm, slightly coloured; when cold and exposed to the light, it assumed a purple tinge, had a slight, sweet, nauseous taste and fœtid odour. It changes the colour of litmus paper.

Experiment 1. To the filtered decoction of the root was added a few drops of tincture of iodine, which instantly struck a deep blue colour, indicating the presence of starch.

On the addition of alcohol to the cold infusion of the root, it caused a gelatinous precipitate. Subacetate of lead also pro-

duced a copious precipitate, showing the presence of gum or mucilage.

To a filtered decoction of the fresh root, a small portion of solution of oxalate of ammonia was added, which instantly produced a dense precipitate; oxalate of soda produced analogous effects, showing the presence of lime in a free state, or perhaps as an acetate. The dried root being subjected to the same process, afforded no precipitates, owing, it is supposed, to the lime assuming the form of a carbonate in the drying of the root, and thus becoming insoluble in water.

A portion of the root, on being boiled in water acidulated with nitric acid, gave, on the addition of ferrocyanate of potash, a deep blue precipitate; in the simple decoction no precipitate was observed; thus proving the existence of iron in the form of protoxide. Infusion of galls produced no effect, showing that it must exist in very small proportion.

On the addition of water to the alcoholic tincture, a white flocculent precipitate was caused, indicating the presence of resin.

The alcoholic tincture, made by macerating ℥j. of the root in ℥vj. alcohol of 35° Baumé for two weeks, was of a reddish, yellow colour, foetid smell, and of a sweetish, nauseous, alliaceous taste, which was much more perceptible when diluted with water; it also slightly coloured litmus red.

The alcoholic extract, obtained by the spontaneous evaporation of the tincture, was of a brown colour, and a sweet, rather acrid taste.

To this extract, water was added, which took up all but a small portion of a tasteless resin and a fixed oil; this aqueous solution when evaporated by means of a water bath to the consistence of an extract, was of a light brown colour, and sweet and bitter taste, like that of peach kernels.

The etherial tincture, made by the action of ℥ij. sulphuric ether on ℥ss. of the root for two weeks, when filtered, was of a bright, golden yellow colour, and reddened litmus paper. Set aside this tincture for spontaneous evaporation; the result was, an extract of a dark brown colour and narcotic smell,

which consisted of a fixed oil soluble in alcohol, and wax with some colouring matter; the oil was tasteless, but the dark colouring matter, which was also soluble in alcohol, had a slight, peculiar taste.

One ounce of the powdered root, was submitted to the action of $\mathfrak{z}\text{vj}$. of a menstruum, composed of 4 parts of hydrochloric acid, to 100 parts of water. This tincture was of a dark, wine red colour.

The addition of oxalate of ammonia caused a very abundant white precipitate, showing the existence of lime, and establishes the view before taken of its assuming the form of carbonate in the drying of the root; this being converted into a muriate by the acid, is then precipitated as an oxalate, by the above named test.

Ferrocyanate of potash, caused a blue precipitate; but the infusion of galls none.

The pure hydrochloric acid was tested for iron, of which it contained scarce a trace, whereas the dilute muriatic tincture gave a very deep blue precipitate.

The surface of a slice of the root was removed by means of a piece of glass, that the root having been cut with a metallic knife might not affect the experiment; it was then moistened with dilute nitric acid, and a drop of solution of ferrocyanate of potash was applied, which gave a greenish blue tint. The iron exists in such small quantity as not to be detected by gallic acid, but the ferrocyanate acts, from being a much more delicate test.

The infusion, made with warm water, contains more of the peculiar properties of the root than any other preparation; it is of a sweetish, bitter taste, leaving, on being drank, an acrid sensation, like tobacco on the fauces.

An infusion of the coarsely bruised root was made, which was very mucilaginous; alcohol was added to precipitate part of the mucilage; the liquid filtered, which was nearly colourless, (it smelled much stronger after the addition of the alcohol than before) to some of the filtered liquor, was added aqua ammonia; which instantly changed it to a light red colour; on

standing it became much deeper, and in the course of twenty-four hours deposited a blackish purple substance, which was separated by filter; it was encumbered by a large quantity of mucilage, and when pressed between the teeth was gritty, but there was so small a quantity of the precipitate, that no experiments could be pursued on it.

An infusion was also made from which the mucilage was precipitated by subacetate of lead; the excess of lead by sulphuretted hydrogen, and ammonia added to the filtered liquid, which gave no satisfactory results.

One thousand grains of the finely bruised root were subjected to the action of ℥xij . distilled vinegar of the specific gravity 1.007 for the space of four weeks, being frequently shaken in the interval; the ingredients were submitted to strong pressure, and the liquid when filtered, was of a bright yellow colour, of specific gravity 1.0405, possessing the fœtid smell of the plant in a high degree.

To this clear filtered solution, subacetate of lead was added so long as any precipitate fell, thus separating any mucilage that might be present; after the separation of this precipitate by the filter, a solution of oxalate of ammonia was added to throw down any excess of lead, as well as lime, that might be present in the solution taken up from the root by the acetic acid; the insoluble oxalates of lead, and lime, were separated by means of a filter, the liquor still retaining its yellow colour. Aqua ammonia was now added, to neutralize the acetic acid; this changed the liquid to a light purple colour; this purple solution was set aside for twenty-four hours, in which time a blackish purple substance was deposited on the bottom and sides of the precipitating glass, the dark coloured liquor was drawn off by a capillary siphon, the remaining portion separated by a filter; this substance was washed with pure water to separate any acetate of ammonia, filtered, and dried with bibulous paper. The precipitate amounted to but four grains; it was of a blackish colour, and granular appearance, insoluble in ether, alcohol or water, but slightly soluble in any of the acids—no taste, perhaps owing to its insolubility; yielding

under the teeth like wax; on being macerated in dilute nitric acid it changed to a brown colour. The purple liquor before depositing all of this substance, is changed by the addition of nitric acid, to a bright red colour; by sulphuric acid, to a turbid red; and by hydrochloric acid to a straw yellow colour.

The acid solutions of this substance are precipitated by alkalies.

On adding a fresh portion of aqua ammonia to the coloured liquid, and setting aside for twelve hours, a further precipitate was obtained, but not in sufficient quantity for experimental purposes. On this substance being exposed to heat, it changes from black to brown; it is probably some peculiar principle of the plant combined with ammonia.

A portion of the root was placed in a retort, enough water added to cover it, and heat gradually applied by means of a spirit lamp, till it reached the boiling point; the water, which was collected in a globose receiver, was redistilled from fresh portions of the root till it came over milky, but no distinct particles of oil were observed; the distilled liquor had some of the odour, but none of the acrimony of the root.

Supposing that possibly the acrid properties of the root might depend on a gaseous principle, an attempt to obtain such gas was made by boiling a portion of the root in a retort, the boiling point being raised by chloride of sodium; when all the atmospheric air was driven off, the vapour was passed through water, and a small portion of gas was obtained, not inflammable, but of a disagreeable smell; also a concrete, oleagenous substance came over and collected on the sides of the receiver, which was tasteless.

A quantity of the root after having been macerated in ether and alcohol, was subjected to the action of a solution of potassa, and then to dilute hydrochloric acid, which left a substance having the properties of lignin.

A portion of the root was incinerated, the product lixiviated with pure water, the solution filtered; it changed infusion of turmeric, brown; this solution was neutralized by nitric acid, and on evaporation yielded crystals of nitrate of potash.

The insoluble residue was dissolved with effervescence by muriatic acid; this solution gave a precipitate on the addition of oxalate of soda, and with ferrocyanate of potash a blue precipitate.

The best mode of preparing this root is, to immediately cut it into transverse slices, about one-fourth of an inch in thickness, in order to dry it as speedily as possible at the common atmospheric temperature in the shade; as soon as completely dried it should be kept in close stopped bottles, carefully secluded from the light, which appears to have as great a deteriorating effect on it as exposure to the air; it should never be powdered except immediately before being used, as in this state it more rapidly loses its peculiar virtues, and becomes wholly inert.

The following are presumed to be the chief constituents of this root, judging from the preceding experiments, viz:

Starch, gum, resin, saccharine matter, a fixed oil, a volatile fatty matter, volatile oil, wax, colouring matter, a peculiar substance soluble in acids, and precipitated by alkalies, lignin, protoxide of iron, and salts of lime and potassa.

SEEDS.—The *Symplocarpus* perfects its seeds about the latter end of September, or beginning of October; they are of various shapes and sizes, some of them roundish, others very much flattened and angular, with the hilum strongly marked; they vary in size from a coriander to that of a hazel nut; of an umber colour externally, with the interior portion of a fleshy consistence, and blueish white colour, sometimes yellowish; when rubbed between the fingers of an unctuous feel in the fresh state, but when dried not so much so; on being cut and drawn across paper they leave an oily trace, which is not volatile; at first they are of a sweetish, rich taste; but on being chewed for a short time create a most intolerable prickling sensation on the tongue, which is very permanent, and followed by a sense of soreness of the mouth.

In the whole state they have no smell, but on being bruised they give out all the peculiar alliaceous odour of the plant

which is possessed by them in as great abundance as any other part, and the acrimony in a much greater proportion.

The seeds on which the following experiments are founded, were collected in the beginning of November on the site of the decayed plant; they were found in clusters of from twenty to thirty each, but owing to the quantities of fallen leaves at this time there was some difficulty in detecting them.

They ought to be collected about the middle of October, as at this time they may be easily procured in large quantities where the plant abounds, its black decayed pericarp readily discovering it to one in the least acquainted with its mode of growth.

A decoction of the seeds was made with boiling water; a portion of this, on being filtered, formed a blue compound with tincture of iodine.

Alcohol on being added to the filtered cold infusion, caused a gelatinous precipitate; subacetate of lead also gave a precipitate.

On adding water to the alcoholic tincture a turbidness ensued, showing the presence of resin.

A portion of the seeds were beat in a mortar, with water, forming a milky emulsion; on drinking a small portion of this, it was similar to that of almonds in taste, but leaving an acrid sensation in the throat somewhat like *Polygala senega*. When this remedy is used, would not this be a good mode of administering it? as when prepared in the same way as emulsion of almonds, it is equally palatable, has all the bulk of the seeds, and consequently their properties; it has, however, one objection, it spoils rapidly.

Some of this emulsion was filtered; into the clear liquid was dropped some solution of bichloride of mercury, which gave a white precipitate; infusion of galls had a similar effect; ferrocyanate of potash also, when added to the liquor, slightly acidulated with acetic acid, gave a white precipitate, also the following metallic salts: subacetate of lead, sulphate of iron, nitrate of silver, &c. &c.; on boiling, the liquor became opalescent; these tests prove the presence of albumen.

The alcoholic tincture made with 3ij. of the seeds finely sliced, to 3iv. of alcohol, was of a light yellow colour, and possessed their peculiar smell.

The extract, prepared from this tincture, was of a light brown colour, consisting chiefly of resin, and a small portion of fixed oil; the resin is rather acrid; this extract had none of the sweet taste of that of the root.

Some of the finely bruised seeds were subjected to the action of sulphuric ether for two weeks; this tincture, after filtering, was of a bright golden yellow colour; set it aside to evaporate spontaneously, during which a yellow oily fluid was deposited, and after the total evaporation of the ether, a black oily fluid was left floating on the surface of the previously deposited oil; this was of an acrid, peppery taste, soluble in alcohol, excepting a whitish flocculent substance, which on examination, proved to be wax.

The fixed oil has a rich, nutty taste, similar to oil of shell-bark, and without any acrimony; it is lighter than water, leaves a greasy stain on paper which is not dissipated by heat; it is but slightly soluble in alcohol; the quantity contained in the seeds is very great, 100 parts of the seeds yielding 20 parts of pure oil.

From the preceding experiments the following appear to be the chief constituents of these seeds:

Starch, gum, resin, albumen, a fixed oil, wax and colouring matter.

ART. II.—PHARMACEUTICAL NOTICES. No. XIII.

Nitro-sulphate of Ammonia.—In our last number, we gave a brief notice of the good effects that had been derived from the administration of nitro-sulphate of ammonia in typhoid fevers; without, however, stating the process by which this article is to be made. As several inquiries have been made on the subject, we subjoin the following, derived from the *Journal de Pharmacie* for August last. At a meeting of the Academy of Sciences of Paris, held on the 20th July, M. J. PELOUZE read a memoir on some combinations of a new acid, formed of nitrogen, sulphur and oxygen, the results of which were:

That on subjecting a mixture of sulphite of potassa, soda or ammonia, and of deutoxide of nitrogen to a temperature of about 0° F., these two bodies completely disappear, giving rise to new salts, having for their formula: $Ko Az^3 So^4 NaO Az^3, So^4 H^6 Az^3 Az^3 So^4 + H^3 O$. These salts crystallise with great facility. They have this peculiarity, that most substances which decompose oxygenated water, also decompose them; without, however, adding or taking away any thing.

The alkalis augment the stability of these salts which M. PELOUZE has called nitro-sulphates, and completely prevent the action of spongy platina, silver, powdered charcoal, and other agents which decompose a solution of the nitro-sulphates in an uncombined form.

The nitro-sulphates may be readily obtained, by passing a current of deutoxide of nitrogen for several hours through a sulphite dissolved in highly alkaline water. M. PELOUZE was unable to prepare nitro-sulphuric acid, without the aid of bases.

Phosphate of Quinia.—Many physicians in Europe prefer the phosphate of quinia to the sulphate; as, in their opinion, it

agrees better with irritable stomachs, and where there is a tendency to, or inflammation of the internal organs. It does not, it is said, produce the uneasiness which sometimes follows the use of the sulphate, as it acts in a less direct manner on the organs of respiration and circulation.

Several modes of preparing it have been advised, but the best results are stated to have been obtained by the following process recommended by WINKLER in BUCKNER. *Repert Pharm.*

Triturate crystallised sulphate of quinia 480 parts, with crystallised hydrochlorate of barytes 1200 parts, add 8 parts of distilled water, filter, wash the residue well, unite the filtered solution and washings, adding 4 parts more of distilled water; to this a dilute solution of phosphate of ammonia is to be very gradually added, and at intervals, stirring continually, till a precipitate is no longer produced. The whole is now to be filtered, and the residue rapidly washed with cold distilled water, and dried by a gentle heat. An excess of the phosphate is to be avoided, or part of the precipitate will be redissolved. By this mode of preparation 46 parts of phosphate of quinia are obtained for every 60 parts of the sulphate employed. It is in a fine crystalline powder, of a brilliant white colour, very light, and of an extremely bitter taste. It is soluble in 480 parts of warm, and 140 of cold water.

Unguentum hydrargyri oxidi rubri.—This ointment is very often badly prepared, and hence disappoints the expectations of the physician. When used for the cure of certain diseases of the eye it is of the utmost importance that it should be completely homogenous, and free from visible particles of the oxide. The best directions for its preparation are those given by Mr. THOMAS CLARKE, in the *Glasgow Medical Journal*. He says, to attain a proper consistence in the ointment, to keep it from spoiling, to obtain a strength readily computed, and to render it uniform and certain, are the great desiderata. For this purpose he proposes the following formula. Take of red precipitate, prepared by nitric acid, good

yellow wax, of each a drachm; prepared lard, an ounce. Rub the red precipitate till it becomes of a uniform orange colour; then mix it with a little of the lard. Mix also the remainder of the lard with the wax and melt them together. When the latter mixture is removed from the fire and has begun to harden, add it to the former, and stir the whole till perfectly cool. In rubbing down the precipitate the utmost care must be taken that this process be continued till it is perfectly impalpable; hence not more than a drachm should be operated on at a time.

Unguentum Cantharidis.—Various formulæ are given in the different Dispensatories and Pharmacopœias for this preparation, some of which are efficient, and fulfil their intention in every particular, whilst others betray a striking want of pharmaceutic knowledge on the part of their proposers. The following, which is recommended by Dr. T. MARTIN, is said to afford many advantages, as it spreads easily, adheres well, and is not liable to deteriorate by keeping.

Four ounces of powdered cantharides are to be infused in twenty ounces of boiling water, and macerated for twelve hours; strain and evaporate by a gentle heat to the consistence of a syrup. Add yellow wax four ounces, resin, olive oil, and spirits of turpentine each one ounce, alcohol two ounces; the whole to be thoroughly incorporated by stirring. If this ointment is required of a greater strength, a larger proportion of cantharides may be used.

Senna and Prunes.—A common domestic aperient is prepared by stewing prunes with senna; this, in most cases, answers the purpose very well, but the taste of the senna is not always sufficiently disguised, added to which, to obtain the desired laxative effect, so large a quantity of the prunes are obliged to be eaten, as to oppress the stomach and bowels. The following mode of preparation has been found very effectual, and of an agreeable taste. Senna leaves half an ounce; supertartrate of potash half a drachm; water half a

pint, boil gently for ten minutes and strain. To the strained fluid add half an ounce of sugar and half a pound of prunes, and simmer till the fruit has absorbed the liquid.

Artificial Musk. This article, which is seldom to be found properly prepared, and from too generally disappointing the practitioner, is but little employed;—when good forms a most admirable substitute for the genuine musk, and in fact, it is far superior to the adulterated article so commonly sold as the real Chinese. Dr. S. W. WILLIAMS, who communicated a highly interesting paper on the subject to the *Boston Med. and Surg. Journal*, speaks of it in the most exalted terms in the treatment of whooping cough, typhoid states of fever, and all the nervous affections. He also states that combined with aqua ammonia, compound spirits of lavender or laudanum, according to circumstances, he has found no remedy so efficient in those attacks of sinking faintness so often present in the last stages of pulmonary consumption, especially when there is distressing dyspnœa and violent palpitation of the heart.

Dr. WILLIAMS says that the preparation he employs, is made according to the following formula. Three drachms and a half of concentrated nitric acid are to be very gradually dropped on one drachm of rectified oil of amber contained in a glass tumbler, or very large wine glass. This mixture, when agitated, grows hot, and emits offensive fumes, which the operator must avoid inhaling. He also adds, that as the acid generally to be met with is not of sufficient strength to produce the proper reaction without the assistance of heat, he usually after mixing the ingredients, places the vessel containing them on an earthen plate, before the fire, until it becomes hot, continually stirring with a glass rod; the reaction is sometimes so rapid and violent as to eject parts of the contents from the glass; hence the use of the plate beneath.

After the mixture has remained at rest for twenty-four hours, it acquires a resinous appearance, and divides into two portions, the lower of which is an acid fluid, and the upper a

yellow resin resembling musk in its smell. This is to be thoroughly washed, first in cold and then in hot water, till all traces of acid are removed.

This article may be employed in emulsion, as is recommended by HUFELAND, made by triturating ten or twelve grains with a few almonds, and adding five or six ounces of water. The dose of this is two tea spoonsful for a child of two years of age. The usual mode of administering it, however, is in tincture, made by dissolving two drachms in eight ounces of alcohol. The dose is twenty-five drops.

R. E. G.

ART. III.—ON SOLANUM DULCAMARA. By JOHN W. SIMES.

(*Extract from Inaugural Thesis.*)

It flourishes profusely in damp and sheltered situations, as on the banks of streams and among the thickets which border our natural meadows. In the United States it extends from New England to Ohio. Its flowering period is from June to August.

The roots and stalk, upon being chewed, first cause a sensation of bitterness, which is soon followed by a considerable degree of sweetness; and hence, the plant obtained the name of *Bitter-sweet*.

The berries have not been applied to medical use; they seem to act powerfully on the primæ viæ, exciting violent vomiting and purging.

The officinal parts of the plant are the stalks and the extreme branches; they should not be of more than one year's growth, and should be gathered in autumn after the fall of the leaves, as the sensible qualities of the plant are then said to be the strongest; in the whole state it is inodorous, but when bruised it emits a peculiar and rather nauseous smell.

“Dulcamara possesses narcotic properties, with the power of increasing the secretions, particularly that of the kidneys and skin. Its narcotic effects do not become obvious unless when it is taken in large quantities. In over doses it produces nausea, vomiting, faintness, vertigo and convulsive muscular movements. It has been recommended in various diseases, but is now nearly confined to the treatment of cutaneous eruptions, particularly those of a scaly character, as lepra, herpes, &c. &c. It is said to be beneficially employed in chronic rheumatism.”

MM. BRAULT and POGGIALE, of Germany, from some late experiments they have made on hyoscyamus and digitalis, have come to the conclusion that many of the vegetable alkaloïds, as hyoscyamia, conia, digitalia, atropia, &c. are nothing more than salts of the alkaline earths, and that the virtues and effects which have been attributed to them have been owing to more or less of the active principles of the plant being mixed or combined with them, as is the case with piperine, the activity of which is generally acknowledged to depend upon the quantity of oil of pepper combined with it. The experiments which I have made on the article, under consideration, would seem to lead to similar conclusions.

Experiment, No. 1. ʒviij. of the bruised twigs of the dulcamara were boiled in six pints of water down to three pints. To the filtered decoction were added (while hot) ʒiij. of magnesia. It was then set aside with occasional agitation for twenty-four hours, filtered, and the precipitate collected and submitted to the action of boiling alcohol fort. for five minutes, filtered; removed the colouring matter by animal charcoal; filtered and set it aside for deposition, but none took place. On evaporating the supernatant liquor there was left a few grains of a yellowish resinous mass, which had very little of the properties of the plant. The liquor filtered from the magnesia was evaporated to the consistence of an extract, which evidently contained most of the virtues of dulcamara, as on taking a small quantity of it, nausea and headache were produced; in this solution there was no alkaline reaction on test paper.

The above was repeated several times with slight variations, with similar results.

Experiment, No. 2.—Repeated No. 1, except f. ʒi . aqua ammoniæ, fort. was added to the decoction instead of the magnesia; this produced a flocculent precipitate; collected on a filter, and boiled it in alcohol, fort. for five minutes; the alcohol took up most of the precipitate, leaving a small quantity of a whitish granular powder, which was insoluble in alcohol, ether, water, and boiling oils, and perfectly fixed in temperatures raised to redness; this evidently was a salt of one of the fixed alkaline earths; after decolourising, the alcohol poured from off the above powder, was set aside for spontaneous evaporation; but nothing was thrown down, leaving a residue similar to experiment No. 1.

Experiment, No. 3.—Made a decoction as in No. 1, to which was added a solution of subacetate of lead, as long as any precipitate was formed. Hydrosulphuric acid was then passed through the mixture, as long as precipitation continued; filtered and boiled the filtered solution; then added ʒiij . of magnesia; boiled for five minutes; collected the precipitate on a filter; submitted it for five minutes to boiling alcohol, fort.; filtered and set it aside; but in the result there was nothing satisfactory.

Experiment, No. 4.—No. 1 was repeated, except alcohol as the solvent was employed, through the whole process, but no trace of an alkali was at all discernible.

Experiment, No. 5.—A decoction as in No. 1, was made, except in using diluted alcohol as a menstruum. In the first stage of the process, the results were similar, except the decoctions had, in a much higher degree, the sensible properties of the dulcamara, than when either water or alcohol alone were employed. From this, it may fairly be asserted, that diluted alcohol is the proper solvent for dulcamara.

I tried a great many processes somewhat similar to the foregoing, and in none of them was there the slightest trace of a vegetable alkaloid discovered by test or perception.

In a decoction of dulcamara, a solution of gelatin produces

a yellowish flocculent precipitate; a solution of protosulphate of iron, a black flocculent precipitate; and a solution of nitrate of silver, a whitish precipitate, which becomes grey on standing; solutions of the tartrate of antimony and potassa, hydrate of potassa, bichloride of mercury and tincture of iodine have no effect on it.

The only officinal form of administration of dulcamara, is that of the decoction, which is made by boiling ℥j. of dulcamara in one and a half pints of water to one pint strained, and taken in doses of f. ℥ij. each.

A tincture was made by digesting ℥iv. of dulcamara in two pints of diluted alcohol in a warm temperature (occasionally putting it for a short time in a water bath,) for 14 days, and filtering. This produces a tincture of a yellowish-red colour, tasting very similar to the plant; the dose of this tincture is f. ℥j.

But a much better form of administration than either of the above, is the extract; the decoction is very frequently inactive on account of the liability of the twigs to deteriorate by keeping, and the tincture would be objectionable in many cases on account of the stimulating properties of the menstruum used in preparing it, while the extract can have none of these objections, if prepared from the twigs when first collected, and the practitioner can (when it is properly prepared) depend upon having a medicine of uniform strength.

The following is the recipe for preparing the extract:

R Dulcamara, (recently dried twigs, bruised)	℥viii
Diluted alcohol	iv. pints. M.

Digest in a water bath, (low temperature) for fourteen days, express, filter, and evaporate in a water bath to a proper pillular consistence, yields 384 grains of a brownish-red coloured extract possessing, in a marked degree, the properties of the plant, producing severe headache, nausea and giddiness. The dose of it is from six to eight grains, repeated at proper intervals.

ART. IV.—MEDICO-BOTANICAL NOTICES. No. IX.

Dioscorea villosa.—This plant, which in some parts of the country is known under the name of *wild yarn*, unlike the cultivated species, has a woody and contorted root, which, according to Mr. RIDDELL, (*Synop. Flora. West. States*) is possessed of valuable medical properties. He states, that a decoction prepared with it is unquestionably a highly useful remedy in bilious colic. This decoction is made by boiling an ounce of the powdered root in a pint of water, and half of which is to be administered at a time. He says that it acts with remarkable promptitude, and adds, that he has been informed that Dr. NEVILLE, of Ohio, places much reliance on the tincture as an expectorant; it also acts as a diaphoretic, and in large doses as an emetic.

Cocculus Indicus.—Within a very few years, the science of medical botany has done much in the elucidation of the origin of various articles of the vegetable materia medica. Thus, to Mr. DON we are indebted for a knowledge of the plants furnishing galbanum and ammoniac; to Dr. COXE, for a settlement of the vexed question of the species of plant producing jalap; and to Mr. HANCOCK, for the light he has thrown on the subject of several important articles derived from South America, &c. &c. Notwithstanding, however, the number and value of these discoveries, this part of pharmacology is still in a very unsettled and confused condition, and offers a wide field for the labours of botanists.

Among those articles involved in uncertainty and doubt, was the *Cocculus indicus*. M. A. RICHARD, however, in a short notice, published about the commencement of last year, has very satisfactorily removed the obscurity that existed with regard to its origin and species furnishing it.

He observes, that LINNÆUS referred it to the genus *Menispermum*, under the name of *M. cocculus* DECANDOLLE

divided this genus, and on a certain number of species erected that of *Cocculus*, including the article under consideration, to which he gave the name of *C. suberosus*. Recently Dr. ARNOTT, in his Prodrômus of the flora of India, has described the male plant of this species, and has shown that it has been already noticed under a variety of names. Thus it is the *Menispermum monadelphum* of the drawings of ROXBURGH, (No. 130) in the collection at the East India House; and the *M. heteroclitum*, ROXBURGH and WALLICH (*Flora Indica*, iii. 817); finally, it is identical with the plant described by COLEBROOKE, (xiii. *Transactions Lin. Soc.*) under the name of *Anamirta racemosa*.

Dr. ARNOTT also states that it is evidently of the same species as the female plants, known under the names of *M. cocculus*, L., and *C. suberosus*, D. C. But as from the structure of its male flowers it cannot belong to either of these genera, he has adopted that of COLEBROOKE, and given this species the name of *Anamirta cocculus*. Its synonymy, therefore, is as follows: *Anamirta cocculus*. WHITE and ARNOTT, Prod. Flor. Penins. Ind. occ. 449. *A. racemosa*, COLEBROOKE. Trans. Lin. Soc. xiii. 66. *Menispermum cocculus*. LINNÆUS, GÆRTNER, t. 70, f. 7. ROXBURGH. Flor. Ind. iii. *M. heteroclitum*, ROXBURGH, l. c. *M. monadelphum*, ROXBURGH, Cat. et icon, 130. *Cocculus suberosus*, DECANDOLLE, Prod. et Syst.

Hibiscus esculentus.—This plant, the fruit of which is so well known as an esculent vegetable, under the name of okra, deserves more notice as a demulcent than it has received. The whole plant, like most of the malvaceæ, is mucilaginous; more especially the pods, which in an immature state, are an excellent substitute for the *Althæa officinalis*, and form a very appropriate article of diet in diseases of the bowels, by simply boiling them in water. As generally eaten, however, in the form of *gombo* and *colalou* from the admixture of stimulants, they are a highly stimulating food.

The ripe seed also forms a good substitute for coffee, or

rather is an advantageous addition to this article, as the decoction prepared from the mixture, although having the flavour and aroma of the coffee, does not cause that excitement of the brain and nervous system, so often produced by the foreign berry.

The mode of preparing this for use is thus given by Mr. ICARD, (*Journ. de Chim. Med.* Jan. 1835.) An equal quantity of coffee and of okra seeds perfectly dry, are to be measured out; the coffee is to be introduced into a roaster and when about half burned, the okra seeds added to it, and the process continued till the latter are heard to crackle. By this plan the okra seeds become completely imbued with the aroma of the coffee. Care must be taken that they are not too long subjected to the action of the heat; when they have assumed a bright chestnut colour, they should be removed. The mixture is then to be ground, and used in the same proportions as pure coffee.

Simaruba. The first account of the Simaruba, is, that some of the bark was sent to Europe in 1713 by the Count of PORCHARTRAIN, as an article used by the natives with signal success in the cure of diseases of the bowels. In 1741, but little additional information, it would appear, had been acquired respecting it, as GEOFFROY (*Mat. Med.*) in speaking of it, says: "est cortex radicis arboris ignotæ in Guiana nascentis, et ab incolis Simaruba nuncupatæ." JUSSIEU, however, used it with benefit in 1718, in an epidemic dysentery then prevalent in Paris.

In 1753, LINNÆUS, who at that time had not seen specimens of the tree, ascribed it to a species of *Pistacia*, or the *Terebinthus major betulæ cortice fructu triangulari*, SLOAN, (*Jam.* 289, t. 99.) In 1756, BROWNE, (*Civil and Nat. Hist. Jam.* 345,) describes a terebinthus, or turpentine tree, the roots of which he was of opinion furnished the Simaruba bark.

In 1763 LINNÆUS had changed his opinion as regarded the origin of this bark, and stated that it was furnished by the *Bursera gummifera*, referring however to the *Pistacia* of

former editions and to BROWNE and SLOANE, and in his appendix also to *Terebinthus Americana polyphylla*, COMMELIN. Hort. I. 149, and to the *Gum elemi* tree of CATESBY. On the visit paid by JACQUIN to the West Indies some years afterwards, he examined the roots of this *Bursera*, and found that they furnished a bark differing widely from the *Simaruba*.

In 1773, Dr. WRIGHT, who paid much attention to the plants of Jamaica during his residence there, found on examination that it was derived from a species of *Quassia*, and under this name sent specimens of the fructification preserved in spirits, to Dr. HOPE, Professor of Botany at Edinburgh, accompanied with the bark of the roots. The following year he also transmitted analogous specimens to Dr. FOTHERGILL of London, by whom they were communicated to LINNÆUS, who acknowledged the correctness of Dr. WRIGHT's observations by adopting this name in the *Supplement* to his *Syst. Veg.*

Dr. WRIGHT, from whose paper in the *Transactions Royal Soc. Edinburgh*, ii. 73, much of the above is derived, states that in Jamaica, this tree is universally diœcious, though most modern botanists are of opinion that it is polygamous. The synonymy of this species appears to be as follows. *Quassia simaruba*, LIN. Supplem. 234. WILLD. Spec. ii. 568. POIRET. Dict. Method. vi. 25. LAMARCK. Illustrat. t. 343, f. 2. WOODVILLE. Med. Bot. ii. p. 211, t. 76. *Simarouba*. AUBLET, Act. Paris. 1776. *Simarouba amara*. AUBL. Guian. ii. 859, t. 331, 332? *S. officinalis*. DECANDOLLE. Syst. S. *Guyanensis*. RICHARD. Elem. Hist. Nat. ii. 786, &c.

R. E. G.

ART. V.—ON HYPERICUM PERFORATUM.

BY HENRY C. BLAIR.

(Extract from Inaugural Thesis.)

THE root of the *Hypericum perforatum* is perennial, fusiform, sometimes spiral, from three to six inches in length, and two or three lines in thickness, sending off a number of horizontal radicles about a line in thickness, which are frequently much distorted. The recent root is of a light yellow colour, which becomes brown by drying. It consists of a thin cortical, and an internal white, very brittle ligneous portion. The stalk of the plant is from one to two feet in height, (generally about eighteen inches,) straight and erect, except the lower section, which is considerably curved. It is ligneous, and is covered with a thin membranous bark, of a dark brown colour, which may be easily separated from it. It sometimes embraces at its junction with the root, the remains of the stalk of a preceding year. Not unfrequently, two or three stems arise from the same root. The upper branches are opposite and alternate, the interval between each pair being about one inch. In other respects they resemble the stalk. The lower or radical branches differ, in their being vine-like and herbaceous. The leaves are six or eight lines in length, opposite and alternate, oval, oblong, obtuse, nerved, sessile, and entire. Their colour is light green, and on being held up to the light, numerous small transparencies, resembling punctures, may be perceived, from which characterist the specific name of the plant is derived. The flowers are arranged in a terminal corymb. They are of a bright yellow colour, and consist of a calyx, which is divided into five equal parts, and a five petaled corolla, enclosing numerous stamina. The root of the St. John's Wort, on being well bruised, and digested in official alcohol for six or eight days, yields a light yellow tincture, which, when evaporated to the consistence of syrup, and suf-

ferred to cool, separates into two distinct substances. The first is of a dark brown colour, very adhesive, insoluble in water, but soluble in alcohol and ether. Its taste is warm and aromatic, resembling that of the oil of black pepper, but in an inferior degree. Its odour has also some resemblance to that of the same principle. When dissolved in a small portion of alcohol, it imparts to that menstruum a greenish cast. Its solution is not affected by the addition of a solution of gelatin or sulphate of iron. The second substance produced is of a red colour, brittle, inodorous, slightly soluble in alcohol and in ether, but very soluble in water. Its solution is of a brownish cast, but on the addition of a solution of the sulphate of iron, it is converted to a deep blue. A solution of gelatin forms with it a precipitate.

The same portion of root acted on by the alcohol, was digested for some days in water, and the infusion filtered. This infusion was not affected by the addition of a solution of iodine, alcohol, or a solution of the subacetate of lead; but a precipitate was formed on the addition of a solution of gelatin. The leaves and the flowers impart to water by decoction, and to alcohol and olive oil by maceration, a deep red colour. The decoction is precipitated by a solution of gelatin, and of the sulphate of iron; but is not affected by the solution of iodine, or of the subacetate of lead. Carefully evaporated, it yields an extract having an odour much resembling that of the horehound. The tincture carefully evaporated, yields two substances precisely resembling those obtained by the same process from the tincture of the root, but in a much larger proportion. The oleaginous infusion acquires, besides its red colour, a slight acrimony, which is perceptible on a drop or two of it being placed on the tongue. I have perused several writers on the materia medica, who have treated concisely of the *H. perforatum*, and the majority of them agree in attributing its therapeutical agency to the presence of a volatile oil, contained in small vesicles, attached to the leaves and the petals of the corolla. No accurate description, however, is given by them of this oil, or of the amount afforded by a defi-

nite quantity of those parts of the plant said to contain it. I attempted to procure some of this principle by distillation, but failed in the experiment, and in consequence of my supply of the herb being small, I was obliged to abandon further proceedings. The only evidence I had of the presence of a volatile oil in this plant was, that when a branch of it was immersed in a vessel containing water heated nearly to the boiling point, a thin stratum of a volatile substance was evident, floating on its surface, the whole presenting such an appearance as it otherwise would have done, had a drop of one of the ordinary essential oils been substituted for the branch of Hypericum. From the several experiments just described I think it is reasonable to suppose, that the only proximate principles of importance contained in the St. John's Wort, are an acrid resinous substance, probably a small portion of volatile oil, tannin, and a red colouring matter. To the first of these it is probable the plant owes, in a great measure, its medical virtue.

St. John's Wort has been employed as a therapeutic agent as long since as the time of Hippocrates. Like many other medicines of long standing, at different periods different opinions were entertained of its efficacy. At one time, its virtues were the subject of the highest encomium; again it was regarded as almost or entirely inert; and again, it was introduced, and acquired celebrity, so that we are almost induced to believe it to be of but little, if of any, importance. Some of the ancient practitioners, however, formed a high estimate of its importance in the treatment of those afflicted with mental derangement and epilepsy.

It is said to be possessed of anthelmintic and diuretic properties. Dr. Cullen, in treating of this medicine, says: "I confess I do not understand how it can act, but though indeed there are testimonies of its virtues in epileptic and maniac cases." The same author also states, that "there are many well vouched testimonies of its virtues, particularly of its diuretic powers."

If St. John's Wort really does possess these properties, it

certainly deserves attention, and would be an invaluable addition to the *Materia Medica*. I am not aware that this plant, or more than one of its preparations, are now used. Some of them, however, were officinal in the foreign *Pharmacopœias*. The preparation to which I have just alluded, is the oleaginous infusion of the flowers. This is frequently used as an application to contusions, speedily removing the blackness, and effecting a cure.

Before dismissing this subject, I think it proper to state, that the *St. John's Wort* is a plant generally detested by the agriculturist in consequence of its pernicious effect on some of his domestic animals. It is a curious fact, that if this plant comes in contact with a white portion of the skin of either the horse or the cow, the part becomes highly inflamed, and a very painful sore is produced; whereas, if the skin be of any other colour, it remains unaffected. I have also observed that if the sore thus produced, from any cause becomes wet, the effect is evidently agonizing pain to the animal. It is also said that sheep, suffered to run in a pasture where this plant is abundant, prematurely shed their wool.

ART. VI.—NOTE ON CERATUM SAPONIS. By E. DURAND.

THE process of the Pharmacopœia, U. S. for the preparation of the Ceratum saponis, presents many difficulties in the execution; added to which the ointment is apt to vary in strength and is of an unpleasant appearance.

An excellent and perfectly white cerate (if white wax be employed,) of very nearly the strength intended, can be readily obtained by the following method.

R Liquor of subacetate of lead, U. S. f. lb. ij.

White soap, lb. ss.

Boil over a slow fire (and towards the termination of this process on a water bath, to avoid burning,) until the articles are perfectly incorporated and the water driven off; then add—

Wax, 3x.

Olive oil, i. pint.

Previously melted together, and mix the whole thoroughly.

The first part of this process might be advantageously applied to the preparation of a lead plaster. The decomposition that takes place when the salt of lead comes in contact with the melted soap, results in a pure margarate and oleate of lead, or *Emplastrum plumbi*, of a brilliant white colour.

SELECTED ARTICLES.

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ART. VII.—RESEARCHES ON THE COMMERCIAL POTASH OF THE STATE OF NEW YORK. By **LEWIS C. BECK, M. D.,** Professor of Chemistry in the University of the City of New York, &c.

POTASH is one of those articles, the manufacture of which, it has been deemed advisable to regulate, by inspection laws, the avowed object of which is to protect the consumer against the negligence or frauds of the manufacturer. In this state, the propriety of legislative action on this subject is, perhaps, more apparent than elsewhere, in consequence of the value of the manufacture, which may be estimated at more than a million of dollars annually. But from the nature of the article in question, it became difficult to devise an unexceptionable mode of inspection, without the employment of some chemical processes, which although sufficiently simple, have not been hitherto adopted. Hence potash of an inferior quality, has sometimes passed through the ordinary inspection, and found its way into our own markets and into those of foreign countries. This fact, which was in a good degree attributable to the erroneous notions which prevailed in some parts of the state, concerning the principles of the manufacture, upon being communicated to Gov. Throop, induced him to present the subject to the consideration of the legislature. The result was a formal investigation, during the sessions of 1832 and 1833, by the committee on trade and manufactures of that body; and as the inquiry involved chemical details, I was honoured with a commission to examine into the various processes adopted in the manufacture of potash, and to analyze samples of the various kinds brought to market. That duty I endeavoured faithfully to discharge, and made full reports of

the results of my investigations. These reports were published among the documents of the legislature, but as their circulation was necessarily limited, I have thought that a summary of the facts which they contain, might be, with advantage, more widely diffused. I have accordingly prepared the following paper, which you will oblige me by publishing in your valuable Journal.

Various methods of Manufacturing Potash, pursued in the State of New York.

The most plausible view of the formation of the carbonate of potash, (the form in which commercial potash occurs,) by the incineration of wood, is that the acetate of potash exists in the wood, and that this, by calcination, is converted into the carbonate. The wood is burned upon the earth, in a situation protected from the wind, the result of which is the formation of carbonate of potash and several other soluble salts, together with some substances upon which water has no action. By lixiviation with hot or cold water the soluble part is dissolved out, and this solution, when boiled to dryness, leaves behind a dark brown saline mass, consisting of carbonate of potash, a minute portion of one or two other salts and a small quantity of vegetable inflammable matter; and in this state it is known in commerce by the name of *Potash*. Calcination, at a moderate heat, completely burns off the colouring particles, and the salt becomes of a spongy texture, and beautiful blueish white tinge; it is then called *Pearlash*.

Such are the simple principles upon which these important articles are prepared. But instead of following them, various substances are frequently added, either previous to, or during the boiling, *ostensibly* for the sole purpose of facilitating the manufacture, but which *really* have the effect of increasing the weight of the resulting mass at the expense of its purity.

To show what absurd notions were entertained on this subject, and the necessity which existed for legislative interference, I will here introduce the specifications of a patent obtained in February, 1831, by an inhabitant of Oswego

County, N. Y., for what is termed "an improvement in the manufacture of potash." Strange as it may seem, many well meaning and practiced manufacturers were deceived by the specious pretensions of the patentee, and actually, for some time, pursued the process which he recommended.

The "improvement" thus proposed is announced in the following words. "The compound used is salt, lime and lamp oil. First, when beginning to melt, after the salt has done rising, it can then be ascertained what quantity of potash you are going to have. Suppose one barrel: First, take half a bushel of salt, sprinkle half of it over the top of the potash: Secondly, take two bushels of slaked lime, add that in the same manner, then the remainder of the salt, and when the lime has disappeared, then add half a pint of lamp oil. This is the quantity used for one barrel; but it may be varied as the nature of the case may require. First, the use of the salt is to create a heat, and to purify the potash; as it is supposed to burn up, and add nothing to the quantity, but to the quality: Secondly, the lime is supposed to melt and become the first rate potash: Thirdly, the oil is to create a blaze to consume: Fourthly, these are the contemplated uses of the above ingredients used by me."*

* It need not excite surprise that such nonsense should gain currency among ignorant manufacturers, when intelligent and even scientific men, often countenance the most absurd pretensions. I once saw the names of several respectable gentlemen, and among the rest that of a professor in one of our colleges, attached to a certificate in favour of a perpetual motion, which the inventor had the folly to exhibit. And, more recently, I have observed that a certain "improved compass needle," has received the approval of several of our naval officers, and has been noticed with apparent commendation in England. (*See Lond. & Edinb. Phil. Mag. &c. May, 1835.*) In regard to this "improved needle," I will only add, that it is said to have been the means of losing, for a friend of mine, a valuable vessel and cargo; and that the construction of it is false in principle, and its use must be hazardous in practice. Scientific men often do themselves great injury and subject those who place confidence in them to serious losses by their endorsements of such valueless papers.

On the subject of this specification, I shall only express my entire concurrence in the remarks of Dr. Jones, the editor of the Franklin Journal. "If," says he, "a patent had been required for deteriorating one of the staples of our country, the one under consideration would most completely have fulfilled the intention ; and it is earnestly hoped that its validity may, in some way, be tested in our courts of law, where we apprehend, it would not be esteemed a 'useful invention' according to the intention of the patent law ; as its inevitable result if acted upon, must be to injure the reputation of American potash in foreign countries ; the material would be entirely spoiled as it regards its use in many manufactures."

There is another patent which deserves a more detailed notice, as it contains a process much more extensively introduced, and which in some respects is a real improvement upon the ordinary mode of manufacture. At least the samples thus prepared, contain, as we shall hereafter see, a larger proportion of alkali, than any at present in market.

The patent to which I now refer, was secured in July, 1831. The original specification may be found in the 9th volume of the Franklin Journal. The process, however, has recently been varied, and now consists, essentially, in employing small leach tubs which are to be prepared in the usual manner, by placing sticks, straw and quicklime at the bottom. Over this is to be placed a layer of ashes, of about four inches in thickness, which is then to be treated with a boiling liquor, prepared by adding eighteen pounds of salt, and one bushel of quicklime to ninety gallons of water. Another layer of ashes is then to be added, which is to be treated with the liquor as before, and so on until four layers of ashes have been introduced,—when cold water is to be added, and to remain five or six hours. The lixivium is then to be boiled and "melted down" in the usual way.

It is asserted that by the above process of working, about one-half the quantity of ashes will be saved, the potash melts easily in consequence of its purity, the kettles last much

longer, and less fuel is required in the melting than by the ordinary method.

This patent, in its principal feature, closely resembles one obtained in England by Thomas Howard, in 1801 ;—the specification of which is recorded in the Repertory of Arts, 1st Series, Vol. 16. It is entitled “specification of a patent for a method of making a British barilla and potash, and of obtaining a greater quantity of alkali than hitherto discovered.” In this process, quicklime, in large proportion, is added to refuse alkaline salts, by which means their decomposition is effected, and a large quantity of pure alkali obtained.

I will now briefly state what I consider to be the advantages and disadvantages attending the American process above described.

Increased amount of alkali obtained from the ashes.—

From the certificate of a respectable gentleman which was submitted to the committee of the Legislature, it appears, that in an experiment which he tried, twelve bushels of ashes yielded upon the old or common plan, seventy-eight pounds of potash, whereas the same quantity of ashes treated according to the process in question, yielded one hundred and forty-five pounds. The general correctness of this result is confirmed by the testimony of several intelligent manufacturers, with whom I have conferred. There is said also to be a great saving of time in performing the operation.

The above advantages, are of course, derived from the use of small leach tubs and the employment of hot, instead of cold water ; by which the alkaline salt is more completely as well as more speedily dissolved.

Employment of Quicklime.—Another benefit resulting from this process, arises from the mode in which the lime is mixed with the ashes in alternate layers. It should here be distinctly observed, that the effect of the employment of lime in the manufacture of potash, depends altogether upon circumstances. When mixed with the ashes, previous to the lixivation, the resulting alkali is more pure or caustic, because the lime combines with the sulphuric and carbonic acids ex-

isting in the sulphate and carbonate of potash, and forms salts which are insoluble in water. This indeed is the mode in which the pure potash of chemists is obtained. In the ordinary process, the lime is placed only in the bottom of a large tub; but in the one under consideration, it is distributed throughout the whole mass of ashes, and thus its action is rendered more efficient.

The correctness of these views is strikingly confirmed by M. Becquerel, who has ascertained by his numerous analyses of different kinds of ashes, that those of the lime burner contain very little sulphate of potash, which is undoubtedly due to the action of the lime upon the sulphate of potash with the assistance of charcoal. This fact, M. Becquerel remarks, may lead to some advantage by adding lime to the wood, the ashes of which are intended for the manufacture of potash. (*Lond. and Edinb. Phil. Mag.* 1833.)

The case, however, is very different, when the lixivium is treated with lime and boiled down, without a second filtration. It becomes then a fraudulent operation, because the salts of lime formed by the decomposition of those of potash will all remain in the resulting mass. And in the law regulating the inspection of Pot and Pearl Ashes, it is made the duty of every inspector to condemn every cask thus adulterated; a fact which can be very easily determined by the want of solubility in the sample, and the effervescence of the insoluble portion upon the addition of a dilute acid.

Upon inquiry, I find it to be a common practice, to use lime in the manner just described.—The reason which the manufacturers urge is, that its addition to the ley while boiling, assists in “keeping back the nitre,” as they term it, and thus facilitating the subsequent steps of the process. By “the nitre” is undoubtedly meant the sulphate of potash, which, being much less soluble than any of the salts contained in the ashes, begins to crystallise long before the others, and forming a solid crust, proves somewhat troublesome, and should be removed, if the quantity be considerable. Instead of this, however, the manufacturers add lime, which, by decomposing

this salt forms the sulphate of lime, and this with the portion of lime not acted on, falls to the bottom of the kettle, while the potash resulting from the decomposition of the sulphate, enters into other combinations. The lime rapidly absorbing carbonic acid from the air, is converted into carbonate of lime, and hence carbonate and sulphate of lime constitute the largest proportion of the insoluble matters, which are often found in such large quantity in our samples of potash.

I have been the more particular upon this point because, in the original specification of the patent now under consideration, it was proposed to add lime to the lixivium, a practice which, however general it may be, I have uniformly condemned. But I have the depositions of two manufacturers, and the assurances of several others, that more recently, the mode adopted is that which I have given above, and in which it will be observed that such addition is omitted.

Addition of Common Salt.—The addition of this substance to the lixivium is a most unwarrantable practice, as it injures the quality of the potash, while its presence cannot easily be detected. The reason of this will be apparent, from the fact long known to chemists, that when common salt is added to carbonate of potash in solution, a double decomposition takes place, the result of which is the formation of chloride of potassium and carbonate of soda; the former being almost wholly useless, and the latter being employed for purposes, other than those to which common potash is ordinarily applied.

The danger attending the adulteration is, that the chloride of potassium and carbonate of soda thus formed, are both highly soluble in water, so that they would escape detection by the ordinary mode of inspection, and samples in which they were contained in considerable quantity, be branded as "first sort."

The reason advanced by the manufacturers in favour of the use of salt, is that it facilitates the "melting of the potash." But this advantage can by no means make up for the positive injury done to the potash by its addition.

It was not until I had proceeded in this investigation, that I ascertained how general this mode of adulteration had become. Several manufacturers have assured me, that salt is almost always added to the lixivium, in the ordinary method of preparing potash. If this is so, the objection which I have to this part of the patented process will equally apply to the other. It is proper, however, to state, that while the proportion of pure alkali in the specimens of potash, which I have analyzed, is in favour of those manufactured by the patented process, the chlorides of sodium and potassium, which may be fairly set down to the admixture of common salt, are also contained in them in larger proportion.

There is one consideration in connection with the use of salt, which is deserving of some attention. And it is that at present, the only object of the manufacturer is to produce an article, which shall pass inspection as "first sort." It is by this brand, that the market price is regulated, and the extra time and labour required to manufacture a more pure potash, would, under the present system of inspection, be entirely lost. A premium is thus, in effect, set upon ingenious adulterations, and, under all the circumstances, we can scarcely attach blame to those, who endeavour to avail themselves of its benefit.

In concluding this part of my paper, justice obliges me to state, that the specimens of potash manufactured according to the patent process, which has been here described, equal, if they do not exceed, in purity, those which have been ordinarily ranked as "first sort." And if the facts, with regard to the increased amount of alkali obtained from the ashes, can be at all relied on, it must be considered in many respects, a valuable improvement. But from the very nature of the case, its continuance, as such, must depend, in a great degree, upon the honesty of the manufacturer, and upon the vigilance and skill of the inspector.

Analysis of several varieties of Potash.—In the examination of these specimens, my chief object was to determine the proportions which they contained, of what are usually called impurities. The other substances which commercial

potash is known to contain, in minute proportions, I did not consider it necessary to separate, as it would have occupied much more time, and after all would have been attended with little practical advantage. My design was, not so much to present complete chemical analyses, as to show, in the plainest manner, the comparative value of the specimens which I examined. The following is the process which I adopted:

A. Five hundred grains of the specimen under examination were dissolved in six or eight ounces of water, heated to about 200° Fahr. and the solution filtered. The matter on the filter was again washed with a small quantity of water, and after being perfectly dried, was weighed, and the amount set down as insoluble residuum.

B. The insoluble matter was treated with dilute nitric acid, and then tested with various reagents. It generally consisted of carbonate of lime, oxide of iron and silex, although the proportions were very various. These I did not think it necessary, in each case to determine.

C. The weight of the filtered solution A, was now determined, and to a known portion of it, acetic acid was added until the alkali was completely neutralized.

D. To this neutral solution, solution of acetate of baryta was added as long as it caused any precipitation, and the whole then filtered; the resulting sulphate of baryta, being dried and weighed, gave by estimation, the amount of sulphuric acid contained in the whole solution (A.) Supposing this acid to be combined with potash, the amount of sulphate of potash, in the sample under examination, was easily settled. No account was taken of the small quantity of sulphate of lime, which might be contained in the solution.

E. To the filtered solution D, nitrate of silver was now added, as long as any thing was thrown down by it. The resulting precipitate was dried and weighed. This was chloride of silver, and from its weight, by estimation, the whole amount of chlorine was determined. Supposing this to have been originally combined with potassium, the amount of chloride of potassium was deduced.

Although from several experiments, I was satisfied that soda was also contained in most of the specimens which I examined, the curious play of affinities between the salts of soda and of potash, rendered it difficult to determine the exact state of combination in which it existed. Indeed, the process required for their separation, especially when the soda is in small proportion to the potash, is so delicate as to preclude its employment in ordinary inspection. It may, however, be of use to the inspector, to be aware of the different effects produced upon the carbonates of potash and soda by exposure to the air; the former, as it is well known to chemists, soon becomes moist, and assumes the liquid form, while the latter is not thus affected. I am the more particular in adverting to this fact, because I have heard it urged as an objection to some samples of potash that, by exposure to the air, they rapidly deliquiated or became moist. But of course the more rapidly potash undergoes this change, the more pure is it to be considered. It should not, however, be understood, that moist potash is the purest; for in this state, it contains a large quantity of water, which adds nothing to its value. I performed an experiment to ascertain the increase of weight which common potash experiences, by exposure to a moist atmosphere. The mass weighed four hundred and thirteen grains. After three hours exposure, it had gained five grains; in twenty-four hours, its weight was increased twenty-seven grains, or more than six per cent.

As I have observed, the presence of soda was inferred in several of the specimens and, had time permitted, might probably have been detected in all. In two of these, however, it existed in such large proportion, that it could be readily separated by adding muriatic acid, and carefully crystallising the solution. I would particularize No. 7 in the following table, which was designated by the inspector, as "highly salted," a decision which my analysis fully confirmed. It is probable, for reasons which have been given in the former part of this communication, that the soda existed in the form of carbonate,

and its occurrence, in such large quantity, may be fairly ascribed to the employment of common salt.

The following table will exhibit the comparative purity of the specimens which I analyzed, and in order to show in what respects they differ from the American potash, analyzed many years since by the celebrated Vauquelin, I have prefixed his results, reduced to the same number of grains which I employed.

Table showing the composition of several varieties of Commercial Potash.

	Insol- uble mat- ter.	Sul- phat. pot- ash.	Chloride of potassium with chlor- ide of sodium.	Carbonated alkali and water.	Total.	Impurities in 100 parts of pot- ash.	Carbonated alkali in 100 parts of potash.
1	.8	66.8	8.7	423.7	500	15.3	84.7
2	58.	37.5	36.5	368.	500	26.4	73.6
3	2.5	31.5	75.	391.	500	21.8	78.2
4	12.	61.	54.	373.	500	25.4	74.6
5	8.	57.5	50.	384.5	500	23.1	76.9
6	57.	22.	46.	375.	500	25.	75.
7	38.	52.	161.	246.	500	50.8	49.2

No. 1. Is the result of the analysis of Vauquelin, made about 1802.

No. 2. A specimen received from an inspector at Albany, and marked as "first sort, but not of the best quality."

No. 3. Supposed to have been made according to the original patent of Ephraim Pearce, (*Franklin Journal*, vol. ix.) in which lime and salt were employed. It was nearly white, with a pearly lustre.

No. 4. From the same parcel as the last, but of a darker colour; the average per cent. of carbonated alkali in the two specimens is 76.4.

No. 5. Received from an inspector, and labelled "made partly on the patent plan"—colour whitish.

No. 6. Another specimen of the same kind as No. 5, but of a darker colour. The average per cent. of carbonated alkali is 75.8.

No. 7. A specimen of a beautiful reddish colour, which had been condemned by the inspector at New York, and labelled "highly salted." A large proportion of the one hundred and sixty-four grains consisted of common salt, which had apparently undergone no change. Although the insoluble residuum was much less than in No. 2, the total amount of impurities was more than fifty per cent. This is an instructive lesson to those who have been deceived by the notion expressed in the first patent, that the salt is "burnt up."

Having now determined, with what I conceived to be a sufficient degree of accuracy, the nature and proportions of the impurities contained in the above, I dissolved three other specimens in water, and to the filtered solutions added nitric acid of known specific gravity until the alkali was completely saturated, according to the ordinary chemical method of ascertaining the value of samples of potash or soda. The following are the results.

*Table of the composition of specimens of Potash determined by solution in water and saturation by nitric acid.**

	<i>Insoluble matter.</i>	<i>Pure alkali.</i>	<i>Soluble impurities, carbonic acid and water.</i>	<i>Total.</i>	<i>Carbonated alkali per cent. by estimation.</i>
8	3.	252	245.	500	From 65 to 70.
9	5.5	251	243.5	500	
10	6.	256	238.	500	

No. 8. Was common potash, "second sort" from New York. No.'s 9 and 10 were from Albany, but the mode of manufacture was not certainly known.

I subsequently analyzed two specimens made with great care, expressly for the purpose of testing the relative merits of the common and patent processes. Depositions of these facts were presented to the committee of the Legislature, and the boxes, containing the parcels, were transmitted to me un-

* This process is perhaps open to the objection stated in the concluding part of this paper.

opened. Portions of them were carefully analyzed, in most cases repeating the processes and deducing the mean. The general formula which I adopted, was that already given, with the addition that during the operation C, I ascertained the amount of carbonic acid, which had been expelled by the action of the acetic acid.

Table of the proportion of hydrate of potash, carbonic acid, &c. contained in two specimens of commercial potash.

	<i>Insoluble matter.</i>	<i>Sulph. of potash.</i>	<i>Chlor. of potassium & sodium.</i>	<i>Carb. acid.</i>	<i>Pure hydr. of potash.</i>	<i>Total.</i>
11	1.7	12.5	6.9	5	73.9	100
12	2.5	10.2	11.1	2	74.2	100

No. 11. Was manufactured according to the common method.

No. 12. Manufactured according to the patent already described. Both were prepared expressly for trial as above stated.

In reviewing these analyses it will be found, that there is almost every variety in the parcels of potash brought to market. In those kinds which pass inspection, the proportion of what is called carbonated potash, varies from about sixty to eighty per cent. It is proper to remark, however, that I use the term "carbonated" in an indefinite sense, for the carbonic acid is seldom in the proportion necessary to constitute the true carbonates. In some instances, as in the two last, the amount of carbonic acid was exceedingly small, which is perhaps to be ascribed to the free use of lime, and to the cautious exclusion of the atmosphere, and also to the fact that I always selected fragments from the interior of a large mass.

Improvements of the manufacture.—From the facts which have now been presented, some opinion may be formed of the nature and extent of the adulterations of the potash, manufactured in the State of New York. It is a question not easily settled, whether any further legislative provisions are necessary to ensure the purity of this article. Taking it for granted

that inspection laws are right and proper, in cases like the present, it seems to me that they should be rendered more efficient in their operation. I know it is urged, with some plausibility, that the reputation of our potash is now higher in foreign markets, than that of any other country, and that it is not for our interest to improve the manufacture. In answer to this, however, one or two facts deserve to be mentioned. The first is that although when potash can be largely adulterated, and still, by the ordinary inspection, pass as first or second sort, there is a premium placed on the most successful adulteration, the fraud cannot long escape detection. The large manufacturing establishments, both in England and on the continent, are generally conducted by practical chemists, who are familiar with the modes of testing the purity of the substances which they employ. Such tests, if I do not mistake, they constantly apply in the case of commercial potash, and by them its true value is determined. American potash cannot surely retain its high character, if the consumer finds it to contain one-third or one-fourth its weight of soda salts.

Another consideration worthy of notice is, that the carbonate of soda, the barilla of commerce, is now extensively manufactured in England and France, and its abundant supply appears destined to exert an important influence, upon the manufacture of potash in this country. The soda-ash, as it is commonly called, is much cheaper and answers equally well for most of the uses to which alkaline substances are applied. Potash, however, will still continue to be preferred in many of the arts and in some indeed it is indispensable. But to retain its value in this respect, it is necessary that it should be of tolerable purity. When it contains a large admixture of salt, it can be of little more value in foreign markets than the soda-ash, and such will soon be its level, if these adulterations become, as all past experience leads us to fear they will, increased in their proportions and extended in their employments.

It is therefore plainly our interest by all means, to prevent the adulteration of our potash, and to encourage the adoption

of those chemical principles, which should regulate the manufacture. But this desirable result can scarcely be expected, without some improvement in the mode of inspection. I am aware of the tact which the inspectors acquire, by the constant examination of samples of potash, and of the accuracy with which they ordinarily judge of their relative purity. But there are cases in which they are liable to be deceived and against which, it is important to guard. Being sensible of the extreme difficulty of introducing new regulations into such an every day business, it is not without some hesitation, that I am induced to offer the following suggestions.

1. There are now, I believe, three sorts of potash recognised by the inspectors; but if my information be correct, the samples passed as "first sort," always contain a considerable proportion of lime, to say nothing of soluble impurities. Another brand designated "pure," or by any other convenient term might, in my opinion, be advantageously introduced. Samples thus branded, should contain no lime or salt, and at least eighty-five per cent. of carbonated potash.

2. The insoluble impurities may be easily determined, by dissolving a known quantity of potash, as five hundred or one thousand grains, in pure rain water, conducting the operation in a glass flask, and applying a gentle heat to facilitate the solution. Then filtering the solution, washing the precipitate, if any, and drying it carefully, the per centage of insoluble matter can at once be ascertained. When the proportion exceeds two or three parts in the hundred, it is probably due to the carelessness of the manufacturer, or to the addition of lime to the alkaline liquor during its evaporation.

3. The soluble impurities are more difficult of detection; and it is by no means easy to reduce the process to a single trial. The mode ordinarily prescribed in chemical works, consists in determining the saturating power of the specimen under examination, and very convenient instruments for this purpose are described by Mr. Faraday, and MM. Descroizilles and Gay Lussac. In these instruments sulphuric acid of known specific gravity, is employed in a fixed quantity, and

added to a given weight of the sample, (previously dissolved in water, and the solution filtered,) until by a test paper, it is shown, that the alkali is exactly neutralized. The amount of acid required to produce this effect, will, if its strength be exactly known, indicate the proportion of pure alkali, contained in the specimen under examination.

It is evident, however, that this process is insufficient to detect the presence of soda, and when that substance is in large proportion, it is too objectionable to be relied on, for the reason that the saturating powers of potash and soda are very different. For example, fifty parts of soda will saturate as much of any given acid as seventy-five parts of potash; so that in practising with this test, a mixture of twenty-five parts of soda and 37.5 parts of potash = 62.5, would give the same result, as seventy-five parts of potash. In this instance then, there would be an error of 12.5 per cent., to say nothing of the difference in the value of soda and potash.

4. If the above remarks are correct, it follows as a consequence, that in all cases where carbonate of soda is mixed with potash, the relative proportions of these alkalies must be determined, before we can fix the real value of the sample under examination.

The only unexceptionable mode of separating potash from soda, is by means of nitro-muriate of platina; but this is an expensive article, and its successful employment requires a nicety of manipulation which can be expected only from the experienced chemist. An approximation to a correct decision on this point may be attained by adopting the steps prescribed in D and C, in the preceding formula. By adding to a known quantity of the alkaline solution, an amount of nitric acid sufficient for its neutralization, the sulphates and chlorides may be thrown down, first by the acetate of baryta, and afterwards by the nitrate of silver. If the latter test occasions an abundant precipitate, we may infer that the solution contains an admixture of common salt; for although chloride of potassium is contained in the purest samples of potash, it seldom constitutes more than two or three per cent.

It may also be mentioned that tartaric acid, when added to a portion of the solution, will throw down the potash in the form of a difficultly soluble salt, (the bitartrate of potassa, or cream of tartar,) but the soda will be retained in solution, and may be separated by subsequent evaporation.

Difficult as are these methods of separating the salts of soda and potash, and desirable as it would be to devise a more simple one, if it is really an object to maintain a system of inspection worthy of the name, heavy penalties should be affixed to the use of all adulterants, and complete analyses of the various samples in market should be made at short intervals by the inspector, or by some competent person under his direction.

Amer. Journ. Sci. and Arts.

ART. VIII.—ON THE RESINS. By HENRY ROSE.

RESEARCHES on isomeric organic substances, and on the manner in which they comport themselves with other bodies are of the highest importance; and those of MM. Blanchet and Sell, on the essential oils, are among the most interesting of these investigations. These chemists have shown that many of the non-oxygenated essential oils were constituted alike, and the observations of other experimenters have augmented the number of isomeric bodies of this class; thus MM. Blanchet and Sell considered as isomeric: 1 and 2, the two oils composing oil of turpentine, to which they have given the names of *dadyl* and *peucyl*; 3 and 4, the two oils constituting oil of lemons, which they have called *citronyl* and *cytryl*; and according to M. Blanchet, to these must be added, 5, oil of copaiba; 6 and 7, the two oils composing oil of Juniper. M. Ettling has also found that the following belonged to the same category; 8, oil of cloves, and 9, oil of valerian, when they are freed from the acid with which they are combined.

The combinations of these oils with oxygen have not hitherto been studied with that attention their importance demands. M. Henry Rose has lately, however, undertaken this task; and being of opinion that it would be most advantageous to investigate the composition of resins furnished by the isomeric essential oils, he confined himself principally to this class; his researches on these were capable of great extension, for, as pointed out by Unverdorben, most of the resins derived from essential oils act like acids, and form saline combinations with inorganic bases; some again, of which several can be obtained in a crystalline form, are wholly destitute of acid properties; the author has, therefore, also examined some of the crystalline resins of this latter character.

RESINS HAVING THE PROPERTIES OF ACIDS.

Resin of Copaiba. No one of the resins can be obtained in as fine crystals as the resin of copaiba; they are best procured by the process first indicated by Schweitzer. They are of a pure white colour, the smaller being transparent, the larger are translucent; they are soft; concentrated alcohol, when aided by heat, dissolves them more readily than when cold. The alcoholic solution reddens litmus paper. This resin combines with the inorganic bases, and these combinations have all the properties of salts. 0.509 grammes of the crystallised resin were decomposed with oxide of copper in the apparatus of Liebig. They afforded 0.464 grammes of water, and 1.459 grammes of carbonic acid; hence 100 parts are composed of—

Carbon	79.26
Hydrogen	10.15
Oxygen	10.59
	——100.00.

Now, this composition is in accordance with that given by MM. Blanchet and Sell as the constituents of colophane, viz.: carbon 79.65, hydrogen 10.08, oxygen 10.27; colophane is an oxide of the oil of turpentine; as the composition of this latter, according to M. Blanchet, is the same as that of the oil

If the resin combines without decomposition with the oxide of silver, it contains in this combination four times as much oxygen as the oxide; for the quantities of oxide of silver indicated above, contain on an average 1.9 oxygen, whilst the resin contains 715. A combination of resin and oxide of silver, in which the proportions of oxygen are in the proportion of 4 to 1, would, according to calculation, be formed of 28.42 oxide of silver, and 71.58 resin; the result of the first experiment is in accordance with this; in the two others, a little resin had been evidently precipitated with the combination.

0.3575 gram. of this, belonging to the quantity employed in the third experiment, and consequently containing 0.2575 of resin, gave, on combustion with oxide of copper, 0.243 gram. of water, and 0.757 gram. of carbonic acid, corresponding to 10.40 per 100 of hydrogen, and 80.65 per 100 of carbon. It results, therefore, that the resin combines with the oxide of silver, without decomposition.

An alcoholic solution of acetate of lead poured into an alcoholic solution of resin of copaiba, caused an abundant precipitate of a combination of resin of copaiba and oxide of lead; this precipitate was less crystalline than that with the oxide of silver. When heated in a dry state, it melted like a resin. To analyze it, M. ROSE calcined it carefully in the open air, and obtained for residue a mixture of oxide of lead and metallic lead; the oxide was afterwards dissolved in diluted acetic acid.

1. 0.455 gram. of the combination gave 0.074 gram. oxide of lead, and 0.048 gram. lead.

2. 0.5755 gram. of the combination gave 0.0415 gram. oxide of lead, and 0.108 gram. lead.

This combination is therefore composed of:

	1st.	2d.
Oxide of lead,	27.63	27.42
Resin,	72.37	72.58

In this combination also, the resin contains four times as

much oxygen as the base. A combination of resin of copaiba and oxide of lead, in which the proportions of oxygen are as 4 to 1, would contain by calculation 26.56 oxide of lead, and 73.44 of resin. The proportion of resin in the specimens subjected to analysis, is therefore a little less. This difference arises from the fact, that an alcoholic solution of the acetate of lead always lets fall a precipitate of carbonate of lead, when it is not perfectly protected from the action of the air.

The combination of this same resin, with lime, gave an analysis:

Lime,	8.32
Resin,	91.68

This combination presented an analogous composition to the last. The oxygen of the base being only a fourth of that contained in the resin. By calculation, a similar combination of resin of copaiba and lime would contain 8.45 per 100 of lime, and 91.55 per 100 of resin.

As the three combinations of resin of copaiba with oxide of silver, oxide of lead and lime, have an analogous composition, it results that this resin seems to form a series of saline combinations with bases, in which the proportion of oxygen in the resin is four times as much as that of the base. It would hence appear that the atomic weight of the resin is four times greater than that indicated in the formula before given. The true formula, therefore, is not $10\text{ C} + 16\text{ H} + \text{O}$, but $40\text{ C} + 64\text{ H} + 40\text{ O}$. M. ROSE thinks that it is rational, and perhaps more rigorously correct, to transform this as follows: $4(10\text{ C} + 16\text{ H}) + 4\text{ O}$.

Crystallisable Resin of Colophane.—This resin was obtained in a crystalline form by RIES and Unverdorben. The latter, especially, has carefully described its preparation, its properties, and its combinations. As it enjoys all the properties of an acid, he named it *sylvic acid*. M. Berzelius designates it as resin *b* of turpentine, whilst he marks the less crystallisable resin found in the same substance as *a*.

Mr. Rose was unable to obtain crystals of this resin sufficiently well defined to determine their form; what he pro-

cured was rather a crystalline mass than distinct crystals. This resin, he also states, crystallises with much more difficulty than that of copaiba.

Its solution in alcohol reddens litmus paper, and possesses all the properties of an acid, as it forms saline combinations with inorganic bases. 0.538 grammes of the crystallised resin, gave by decomposition with the oxide of copper, 0.481 grammes of water, and 1.540 grammes of carbonic acid; its composition is, therefore:

Carbon	79.15
Hydrogen	9.93
Oxygen	10.92
	——100.00.

From these, and a series of experiments similar to those instituted on the resin of copaiba, it results, not only that the crystallisable resin of colophane has the same composition as the resin of copaiba, but also that both, considered as acids, have the same capacity of saturation. There is, in fact, the same relation between them, as between tartaric and paratartronic acids; but the resemblance is even greater, as both are anhydrous, whilst tartaric acid is distinguished from paratartronic in the crystalline state by containing a less portion of water of crystallisation.

The combination of this resin with lead has precisely the same composition as that of lead and the resin of copaiba. It is in the form of a white powder, which melts at a low heat like a resin.

Uncrystallisable Resin of Colophane.—Unverdorben has called this *Pinic acid*, and, as before stated, Berzelius has designated it as Resin *a* of turpentine. Although it cannot be obtained in a crystalline form, M. Rose subjected it to some experiments, more to ascertain its capacity for saturation, than to determine its composition.

Its alcoholic solution presented precisely the same phenomena as those with the crystalline resin. Its combination with lead is insoluble in alcohol; it is prepared in the same

way as that with the crystalline resin. 0.6255 grammes of this combination gave on analysis, 0.0275 grammes of oxide of lead, and 0.133 grammes of lead, it is therefore composed of:

Oxide of lead	27.31
Resin	72.69
	——100.00

This same combination, analyzed with oxide of copper, gave precisely the same composition as that of resin of copaiba and the crystallised resin of colophane.

General Observations on the Acid Resins.—It follows, from the preceding experiments, that the resins produced by the oxidation of the essential oils are not only isomeric, but also that they have the same capacity of saturation as regards bases. MM. Blanchet and Sell have found that the isomeric essential oils, which are not oxigenized, combine with hydrochloric acid, sometimes in one proportion, sometimes in another.

If the above mentioned resins be considered as acids, they differ from most of those of organic origin, by the absence of water of crystallisation; as it is well known that hitherto but few of the organic acids have been obtained in an anhydrous state, except by combining them with bases. Unverdorben, it is true, considers sylvic acid as a hydrate, but this opinion is contradicted by the experiments of M. Rose.

All the combinations of the acid resins with bases examined by this chemist, are also destitute of water of crystallisation; after having washed them with alcohol, they dry readily, and do not attract moisture from the air.

The change of essential oils into resins has often been compared to that of fatty bodies into acids, but the experiments of M. Rose show the fallacy of this comparison; doubtless by the oxidation of fatty substances in the air a small quantity of acid is generated, but there is also a formation of other products; whilst the transformation of the essential oils into resins is a simple result of the oxygenation of the oil by the oxygen of the atmosphere.

Resins which do not possess the properties of Acids.—M. Rose treats only of a few of the crystalline resins of this

class, which have been denominated sub-resins by M. Bonastre, who was the first to prepare several of them. Their principal distinctive character is that of being less soluble in alcohol than the other resins and of being partly deposited from their solution in boiling alcohol.

Crystalline Resin of Elemi.—If elemi be treated with cold alcohol, and the residue be then dissolved in boiling alcohol, by the spontaneous evaporation of the solutions, a certain portion of a crystalline resin will be obtained, which can be purified by redissolving it in boiling alcohol; the product amounts to one-third of the elemi employed. It is in confused crystalline masses, the form of which is indeterminate. It is of a pure white colour, completely soluble in boiling concentrated alcohol; the solution does not act on litmus paper; it becomes opalescent on cooling, as a portion of the resin separates; at the end of a few days, the separated portions form a flocculent crystalline mass.

The alcoholic solution is not rendered turbid by an alcoholic solution of potash, but an aqueous solution of this alkali throws down the resin in a white mass. The addition of liquid ammonia to the alcoholic solution transforms it into a soft, white jelly. The alcoholic solutions of acetate of lead and nitrate of silver do not cause any precipitate, nor does this take place if a small portion of ammonia be added to a mixture of the solutions of the resin and of nitrate of silver.

If this resin be distilled, a brownish balsam first passes over, of an agreeable smell, and which reddens litmus paper; if the heat be increased, this balsam becomes brown and acquires a disagreeable smell, but still reddens litmus paper; no water is produced, and only a small portion of charcoal remains in the retort.

I. 0.557 grammes of this resin burnt with oxide of copper, afforded 0.5685 grammes of water, and 1.677 grammes of carbonic acid.

II. 0.7635 grammes gave 0.7735 grammes water, and 2.288 grammes carbonic acid.

III. 0.581 grammes gave 0.581 grammes water, and 1.729 grammes carbonic acid.

Its composition is, therefore:

	1st.	2d.	3d.
Carbon,	83.25	82.85	82.29
Hydrogen,	11.35	11.24	11.11
Oxygen,	5.41	5.91	6.60

The result of the first experiment accords very well with the composition of a combination composed like the previously described resins, except that it shows one-half less of oxygen. Its true composition would be, carbon 83.61, hydrogen 10.91, oxygen 5.47. This might be expressed by the formula $2(10\text{C} + 16\text{H}) + \text{O}$. This formula would also express that this resin is a lower degree of oxidation of the radical, the higher being the acid resins.

Crystalline Resin of Euphorbia.—This is prepared in the same way as the former, but cannot be procured of as white a colour. The form of the crystals is indeterminate.

It is more soluble in alcohol than the resin of elemi; this solution has very little acidity. It has no effect on litmus paper; it does not become opaline on the cooling of the solution, but the resin separates in the form of groups of mammillary crystals. Ammonia produces a white cloud, but the resin does not separate in a gelatinous state, like that of elemi; it is not affected by an alcoholic solution of potash, or even an aqueous one of this base. Solutions of acetate of lead and nitrate of silver do not cause any precipitate.

On distillation, this resin comports itself like that of elemi, the brown balsam obtained by this operation reddens litmus paper.

Its composition, ascertained by burning it with oxide of copper, is:

Carbon	81.58
Hydrogen	11.34
Oxygen	7.07

M. Rose regards this resin as isomeric with the crystalline resin of elemi, and that the difference in composition arises from its retaining a small portion of foreign matter, from which it was found impossible to free it.

Journ. de Pharm.

ART. IX.—ON THE AROMA OF THE JONQUIL.

By M. ROBIQUET.

THE odour of most aromatic plants appears to reside in an essential oil, which can be obtained by distillation; but there are several, as the jonquil, the jasmine, the heliotrope and the tuberose, which although endowed with the richest perfume, do not furnish it in a separate state, and hence to extract it, recourse is had to different methods, the most common of which, is that of placing these flowers in contact with cotton, saturated with some bland and inodorous vegetable oil. This in time becomes charged with the odour of the flower, and is then employed for various purposes by the perfumer. This has led to a belief that these flowers, either contained no essential oil, or that it was so volatile as to prevent its being obtained in a condensed form.

As distillation was useless, I was obliged to have recourse to other means and particularly to the employment of various menstrua. Ether having appeared the most likely to afford good results, from the readiness with which it dissolved the oils, as well as the facility with which they separated from it when the solution was exposed to a very low temperature; I hence had recourse to my adapters,* and with additional evi-

* For description of this apparatus, see *Journal Phil. Coll. Pharm.* iv. p. 70.

dence that the principal merit of this kind of lixiviation is, that it extracts substances according to their order of solubility in the menstruum employed.

I therefore filled one of these adapters with jonquil flowers, then poured ether over them, and immediately closed the end with a cork, to prevent the fluid from escaping too rapidly. In fact, it passed drop by drop, and at long intervals. The next day I found in the receiver, two distinct portions of fluid, which I separated by means of a funnel. The upper one was formed of ether of a beautiful lemon colour; the other was merely the watery fluid of the flowers, and was of a greenish colour. The ethereal tincture was immediately subjected to distillation in a water bath, at so low a heat as not to boil the ether. A second and third lixiviation were made in the same manner; each of the tinctures thus obtained was distilled separately, that the products might be the better compared.

The first retort contained a deposit of small yellow masses, variously grouped on the sides, and also some of the ethereal fluid; this was decanted into a small capsule and permitted to evaporate spontaneously. The concrete deposit was removed after the retort had been well drained and the fumes of the ether had entirely disappeared. This substance diffused a strong smell of jonquil, but modified with a somewhat herbageous odour. This was not the case with the residue in the capsule, its smell was perfectly analogous to that of the fresh flower. This residue not becoming dry in the open air, I placed it on some folds of blotting paper to absorb the moisture, but soon perceived that the fluid was oil and not water. The paper which had become impregnated with it, diffused the most delicious scent. I therefore washed all the product that remained of the first distillation in cold ether, which I immediately filtered, and thus obtained on the spontaneous evaporation of the ether, a few drops of a very odorous yellow oil.

The product in the second retort resembled that in the first. When, however, it was examined with a microscope, it was evident that instead of mammillary or tuberculated masses, it

consisted of small collections of crystals. They diffused very little odour, and this difference was still more perceptible in the contents of the third retort. It should also be remarked, that after each treatment the product of the distillation was less abundant. The third being very trifling I did not push the treatment with ether further, and had recourse to alcohol. This afforded a tincture of a darker colour, being of a brownish tint. This was likewise distilled, and a few yellow mammillary masses, resembling those above described, were obtained, and also a somewhat consistent brown oil, which when heated, gave out a disagreeable smell like that of fish oil.

It appears evident from these experiments that the aroma of the jonquil resides in the oily product combined with the ether of the first treatment. At the same time, to verify whether the concrete substance was in itself odorous, I first washed it with ether and afterwards heated it with boiling alcohol. It was completely dissolved, but on cooling, some gelatinous flakes separated, which when collected on a filter, were found to be white and inodorous; they proved to be wax. The alcoholic solution was evaporated and the mamillary substance obtained, with its primary characters, but on being drained and then dried in the air was found to be destitute of odour.

Hence, the aroma of this flower resides in the oil obtained on the first treatment with ether. But it remains to be ascertained why it cannot be procured by any of the ordinary methods. I am not at present prepared to answer this definitively, as I have not made a sufficient examination of the subject, but in the mean time I may state that this oil is in very small quantities, and is in all probability readily altered. I am even inclined to consider the concrete substance as a result of an alteration, on the following grounds. When the first ethereal tincture has deposited this concrete substance, and on evaporation furnishes only a trace of oil, the last residue is a butter-like matter which becomes liquid by the mere heat of the hand. It may be preserved in this state for several days, but at last grows harder, does not melt even at 212°

F., and from being transparent becomes opaque. When examined with a microscope, a multitude of small yellow grains are discoverable, resembling the concrete substance obtained from the first tinctures. If this product be treated with ether, it dissolves in an incomplete manner, and this solution, if spontaneously evaporated, affords a yellow inodorous powder identical with the mammiform substance. I at first thought that the ready liquefaction of this product might be owing to the presence of some ether. But if this were the case, the same phenomena would occur when the concrete oil was again treated with that fluid, which, however, is not the case.

To ascertain whether this aromatic principle was very volatile, I heated it to 212° in a proper apparatus. Nothing condensed in the receiver except a few drops of an ethereal fluid, and I did not remark the slightest trace of oil, but the whole apparatus was filled with a powerful odour of jonquil, and the product operated upon was sensibly diminished in volume. Nevertheless, what remained was still very odorous. Hence, it would appear, that this aromatic product is volatile, but at the same time cannot again be condensed.

I cannot terminate these observations without mentioning a remarkable property of this same product,—its property of giving a black tinge to iron. Having used the point of a knife to detach some portions of it, I perceived that every part of the blade with which it came in contact was covered with a coat of black.

I have already stated that the concrete product of the ethereal tincture appeared to me to be the result of an alteration of the odorous oil; the following considerations would seem to strengthen this conjecture:

I repeated the treatment of the flowers by ether twice; and the second time, I operated on flowers that had been expanded for some days, and obtained proportionably less of the oil and more of the concrete substance. It was remarkable that as this latter became divested of the former, it lost in like proportion its tendency to assume a mammiform appearance, till finally, that obtained from the last solutions in ether assumed

a crystalline form, resembling that of *sal ammoniac*. This product also was capable of being sublimed without losing its colour; when heated in a tube, fumes were developed which condensed in small yellow flakes; it is well known that this takes place with neither wax or resin. The essential oils of lemon, &c. deposit in the vessels in which they are kept, a yellow pulverulent substance, which appears to have some analogy to this substance.

I may also state that it is remarkable that the brown oil obtained from the alcoholic tincture, had not been taken up by the ether, as almost all products of this kind are soluble in this vehicle; but I never observed the slightest trace of it in the ethereal tinctures; it might almost be supposed that it was produced under the influence of the alcohol; for after it is once procured in a free state, it is very soluble in ether; hence if it had pre-existed in the flowers, it must necessarily have been taken up by that fluid. It may be, however, that it was contained in small vesicles, whose substance was insoluble in ether, but soluble in alcohol, and hence was protected from the action of the former. It is certain, at the same time, that the solubility of this oil in ether is so great, that I could not make use of this vehicle as a mode of separating it from the concrete yellow substance, even without the aid of heat.

It is owing to the presence of this brown oil that the alcoholic tinctures are so dark coloured, for but little of the concrete substance is taken up by this product. The caustic alkalies dissolve the brown oil and give it a still darker colour. Its smell is widely dissimilar from that of the jonquil; on the contrary, it has some analogy to that of fish oil; this odour is much increased when the oil is heated.

To conclude, without adverting to the principles combined with the water of vegetation, we here have four distinct products extracted by simple lixiviation, and without destroying the organization of the flowers, and all eliminated in the order of their solubility. The odorous oil passes off with the first washing with ether, then the concrete, yellow substance, accompanied with a little wax, and finally, by the alcoholic

treatment we obtain a resinoid oil, which appears to be analogous to chlorophylline.

If these processes be repeated with the intention of obtaining the aroma of the jonquil, the flowers should be used as soon as they have fully opened, in order to avoid, if possible, any change in the oil from the action of the air, and its transformation into the concrete substance. It has been shown, that the oil can be procured by a single washing with ether, as the aromatic portion is the first that is taken up, and hence the subsequent processes of evaporation, &c. can be rapidly performed, so as to prevent the oil from being exposed to the action of the air for a long time.

Journ. de Pharm.

ART. X.—NOTE ON FUMARIC ACID. By M. WINCKLER.

Fumaric Acid.—Dr. Winckler described some time since in *Buckner's Repert. Pharm.*, a peculiar acid existing in the juice of the Fumitory, in the form of a fumarate of lime, and in small crystalline grains, in the extract of this plant. The process he advises in order to obtain it, is to coagulate the juice of the fumitory by ebullition, to treat with animal charcoal, and to precipitate with acetate of lead. The precipitate, after having been well washed, is to be mixed with a great quantity of water, and decomposed by means of sulphuretted hydrogen. On filtration, a fluid is obtained, which, after due evaporation, deposits on cooling a great quantity of crystals of fumaric acid. M. H. Demarcay, however, after a careful examination and analysis of these crystals, has satisfied himself that they are identical with the paramalic acid of M. Pelouze.

Journ. de Pharm.

ART. XI.—ON THE PROPERTIES OF LIQUID CARBONIC ACID. By M. THILORIER.

Dilatation.—This liquified gas presents the strange and paradoxical fact, of forming a liquid more easily distilled than the gases from 0° to 30° C. Its volume augments from 20 to 29, that is to $+ 30^{\circ}$ C.; this augmentation equals about half the volume this liquid presents at 0° C.; in short, its dilatation is four times greater than that of air, which from 0° to $+ 30^{\circ}$ C. dilates $\frac{30}{267}$, whilst the expansion of liquid carbonic acid, between the same thermometrical limits is $\frac{116}{267}$.

Vaporization.—If the temperature of a tube containing a small quantity of liquid carbonic acid be increased, this liquid boils, and the vacuum becomes filled with vapour, which increases in quantity in proportion to the elevation of the temperature. At $+ 30^{\circ}$ C. the quantity of liquid at 0° required to fill the vacant space, is equal to one-third of the length of the tube. At 0° the proportion of fluid is only $\frac{1}{12}$ of the space filled.

Pressure.—From 0° to $+ 30^{\circ}$ C. the pressure of the vapour furnished by the liquified gas rises from 36 to 73 atmospheres; this gives an augmentation of one atmosphere for each degree; it must be remembered that the weight or density of the vapour increases in a proportion far greater than that of the pressure, and that the law of Mariotte is not applicable after liquifaction has taken place. If the density of the vapour be taken as a basis to determine the degree of pressure, that at 36° C. would be 130 atmospheres, whilst the gauge only indicates 73.

Thermoscopic effects.—If a glass tube containing a portion of liquid, and one of gas be subjected to the action of heat, two contrary phenomena will present themselves.

1st. The liquid will augment by dilatation.

2d. It will diminish by vaporization.

The thermoscopic phenomena are very different, according to the relative proportions of liquid and gas; the former will either dilate, or contract, or remain stationary.

These anomalies have enabled me, says M. Thilorier, to verify the extent of the dilatation and vaporization of this substance. It would appear, that the point of equilibrium, above which the liquid augments in volume, and below which it diminishes is when the liquid occupies $\frac{1}{3}$ of the tube at a temperature of 0° C. If it fills a third, it becomes a retro-grade thermometer, rising with an increase of cold and sinking on the application of heat. If it occupies two-thirds of the tube, it will have the properties of a mercurial thermometer. Its range, however, is limited to $+30^{\circ}$ C.; for above this temperature the tube will be entirely filled with the expanded liquid.

A thermometer of this kind, for all temperatures below $+30$ C. would have a great advantage over those in common use. It has been shown that those instruments gradually undergo an alteration, which unfits them for accurate observations.

Specific gravity. This liquified gas, whose specific gravity at 0° C. is 0.83, presents the singular phenomenon of changing its density from 0.90 to 0.60 in a scale of temperatures from -20° to $+30^{\circ}$ C.

Action on external bodies. Liquid carbonic acid is absolutely insoluble in water, and is incapable of mingling with it. It is soluble in all proportions in alcohol, ether, oil of naphtha, oil of turpentine and carburet of sulphur. It is decomposed with effervescence by potassium; it exercises no action on metals belonging to the six last classes, neither has it any sensible action on lead, tin, iron or copper.

Cold produced by its sudden and instantaneous change

from a liquid to a gaseous state. When a jet of liquid carbonic acid is directed on the bulb of a spirit thermometer, the alcohol rapidly sinks to -90° C., but the frigorific effects do not correspond to this great depression of temperature; this is owing to the almost total absence of conductivity and the slight capacity for caloric possessed by the gas; hence, the intensity, although enormous, is limited to the point of contact; congelation of mercury can only be produced in very minute quantities, and if the finger be exposed to a jet of the liquid, a highly painful sensation of burning is produced; but the injury is almost always confined to the epidermis.

When ether is mixed with liquid carbonic acid, the ether becomes volatilized. The effects produced by a blowpipe fed with ether rendered gaseous by means of carbonic acid are remarkable; a few seconds suffice to congeal fifty grammes of mercury. If the finger be exposed to the jet, the sensation is intolerable.

Carbonic acid, gaseous at common temperatures and under the ordinary pressure, and liquid under a pressure of thirty-six atmospheres, also becomes solid about -100° C., and remains in this state for a few minutes in the open air, and under the usual atmospheric pressure, whilst at ordinary temperatures its expansive force is so great that it produces an explosion as powerful as the same weight of gunpowder.

This solidification can also be produced by directing a jet of carbonic acid into a small vial; this becomes almost instantly filled with a white pulverulent flocculent substance, which adheres very firmly to the glass, and cannot be removed without breaking the bottle; the promptness with which this product forms in cavities impervious to air or the vapour of water, is one of its most remarkable characteristics.

In assigning -100° C. as the point of solidification of liquid carbonic acid, the author is sustained by facts in the experiment made before the committee of the Academy; a spirit thermometer sank to -87° C.; by adding to these 87° the six degrees which the alcohol would have sunk, if the whole tube had been subjected to the frigorific action, we have 93° , a

number which is certainly not the maximum of the effect produced by this agent.

M. Thilorier adds that this example of the solidification of a gas, is the more striking and extraordinary, from its having taken place with a gas which requires a great mechanical compression to enable it to assume a liquid state, and which instantly resumes its natural form as soon as the pressure is removed. *Journ. de Pharm.*

ART. XII.—NEW RESEARCHES ON OPIUM AND ITS PRINCIPLES. By J. PELLETIER.

I.

I HESITATED for a long time, before I determined to present this memoir, thinking that another treatise on opium would be considered as a work of supererrogation. At the same time, I felt satisfied that many particulars, especially of the chemical history of this drug, were still involved in obscurity, and required elucidation. In a former paper, I made known a new principle, narceine; still more recently, I announced that another principle also existed in it, which I named *paramorphine*; but these two substances required further investigation as respected their chemical and physical properties. The analysis of an opium obtained in France, by incisions made in the capsules of the poppy, presented some peculiarities worthy of notice; as for instance, the absence of narcotine and its replacement by an additional portion of morphia; the discovery of a substance which is only accidentally to be met with in opium, and which although wholly different from morphia, might be confounded with this salt. My being in possession of some facts with regard to morphia of great importance in legal medicine; and, finally, my desire of rendering

public some processes applicable to this branch of chemical analysis, have all determined me to write on a subject, considered by many as exhausted, but in which I on the contrary think that much remains to be done.

II.

When opium is treated by the experimental chemist, it rarely happens that he is enabled to operate on large masses, hence it happens that some of its immediate principles, especially those which exist in minute proportions, almost always escape notice. In a manufactory, where processes are performed on a large scale, other causes of disappointment present themselves, and great precision is hopeless. As large quantities of the raw material are acted upon, the processes become very tedious, and much time is required for the various manipulations; as filtering, evaporation, &c.; hence substances are liable to change, to react on each other, or to be totally destroyed; in short, the modes of extraction applicable to certain immediate principles of vegetable origin, on a small scale, are not practicable when large masses are to be operated upon. But the result of those operations which too generally are promulgated, are of interest to science, and often merit the widest circulation. My researches of late have principally been directed to the examination of a large quantity of *mother waters*, left after the separation of *morphia*.

III.

Examination of the ammoniacal mother waters of Morphia.

To obtain narceine and meconine, I have already said, that after having separated the morphine, narcotine and meconic acid from a watery solution of opium, by means of ammonia and barytes, the fluid must be evaporated to a certain point, and then suffered to stand till the crystals form; there is here great difficulty in acting on large quantities. If evaporation be not carried far enough, the fluid ferments and becomes covered with mouldiness; affording only denaturalized products

and ammoniacal salts; if, on the contrary, it be pushed too far, the density and viscosity of the mass prevents crystallisation, and meconine and narceine will not be obtained. To this cause I attribute the want of success of some chemists who have repeated my experiments. The great point is to reduce the mother waters to a crystallisable point. This can be done by acidulating them with hydrochloric acid, then evaporating to the consistence of a thin syrup; this, when kept in a cool place, will become of a honey-like consistence, from the occurrence of thousands of crystals, so small that they are oftentimes only to be distinguished by their sparkling when exposed to the direct rays of the sun. This mass is to be poured on a linen filter, and the thick and viscous fluid that escapes is to be kept for further examination.

To purify the crystals, after having subjected them to pressure in a cloth, they are to be dissolved in alcohol, 36° B., with the aid of a gentle heat. In this operation considerable quantities of caoutchouc and extractive matter are separated. The alcohol must be saturated as far as possible, so as to obtain a crystalline mass on its cooling, or, at all events, after a slight evaporation; this crystalline matter is to be redissolved in a small quantity of boiling water, treated with animal charcoal, and again crystallised.

The alcoholic mother waters will afford a further supply of crystals, by spontaneous evaporation; these are to be treated in the same manner. The crystals must, in fact, be rendered as white as possible by repeated solutions and recrystallisations, taking care at the same time that the mother waters are exhausted at each repetition of the process. I would here remark that the successive employment of alcohol and water is requisite, because the purification of the crystals depends on two circumstances,—crystallisation and decolouration by animal charcoal; and it is well known that the latter is better accomplished by the aid of water, whilst the former is more perfect through the medium of alcohol. The crystals thus purified, were subjected to a series of experiments, which need not be enumerated, but which were intended to determine

their nature; the result was, that they consisted almost wholly of hydrochlorate of morphia, narceine, hydrochlorate of ammonia and codeine, and finally of meconine.

To obtain the morphia, narceine and codeine, the crystalline mass is to be treated with a sufficient quantity of water to dissolve $\frac{90}{100}$, at a temperature of 120° F.; the undissolved portion will consist almost entirely of narceine; if it is found to contain any hydrochlorate of morphia, it is to be recrystallised once or twice.

The narceine thus obtained, must be treated with ether, which will free it from any traces of meconine; though it seldom contains much, for meconine is much more soluble than narceine under the influence of an acid. The narceine being separated, the solution containing the other substances, is to be evaporated till crystallisation takes place; the crystalline mass is to be treated with sulphuric ether, which will dissolve the meconine only, codeine when united to an acid being scarcely soluble in this fluid. Finally, to separate the morphia and codeine, the crystalline mass is to be re-dissolved and water of ammonia added; this throws down the principal part of the morphia, and the filtered solution being treated with a slight excess of potash, will afford a precipitate of the codeine. This precipitate is to be dissolved in weak ether, which on evaporation will afford fine crystals. Care must be taken not to use too great an excess of potash, or a too concentrated solution of it, as in either case the codeine will be redissolved; it is therefore preferable to leave a little morphia in the precipitate, as this can be separated in the treatment with ether.

The black viscid liquid which was laid aside for examination, was found to contain a large proportion of crystallisable principles, which I found very difficult to separate. The plan I finally pursued was a simple one, but was the result of a great number of trials, in which I was assisted by Mr. Dubose, one of my pupils, with great zeal and perseverance. The black viscous liquid was evaporated to the consistence of a soft extract; alcohol was added, of 24° B.; a separation took place; one portion remaining insoluble, whilst another was

taken up. The insoluble parts consisted of ammoniacal salts, sulphate of potash, and black extractive matter. The alcoholic solution contained meconine, narceine, and much codeine; all however contaminated with a black matter, which it was necessary to get rid of; this was effected by adding a fresh portion of alcohol of 38° to 40° , and continuing to add it as long as any precipitate was formed; the black matter was partly dissolved in the weak alcohol, and was precipitated on the addition of the concentrated spirit; this retained in solution the meconine, and the organic alkalies in the state of hydrochlorates. As to the narceine, it was remarkable, that although very soluble in strong alcohol, it was almost wholly carried down with the extractive matter. To separate it, the precipitate was treated with alcohol 40° B. and at a boiling temperature, the extractive matter became indurated, whilst the narceine was dissolved; the hot solution was filtered, and afterwards distilled to separate the excess of alcohol; the remainder, on cooling, afforded the narceine in a crystalline state.

The separation of the morphia, meconine and codeine dissolved by the cold alcohol, was effected by the method previously described. The mode of operating just spoken of, will permit the manufacturing chemist to derive much advantage from those mother waters of morphia, which have hitherto been considered of no value; it is also applicable, with slight modifications, to the dark coloured mother waters resulting from the process of Dr. Gregory; considered in a scientific point of view, it is of interest, as it confirms the existence of narceine, and tends to demonstrate that the codeine of M. Robiquet is really an immediate principle of opium, and not the product of a reaction. In fact, one of the surest modes of ascertaining whether a substance exists in a formed state in an organic product, and is not the result of a reaction, is to endeavour to obtain it by different modes of operating; by menstrua, which cannot react on the elements of the original substance, and by agents whose reactions are diametrically opposed to each other. If, by these means, an identical substance is separated, it may be assumed as certain, that it existed in a formed state.

IV.

Treatment of the Alcoholic Mother Waters of Morphia.

After having examined the ammoniacal mother waters of morphia, obtained by the process of Sertuerner, I next passed to the investigation of the fluid known under the name of alcoholic mother waters.

It is well known, that on the addition of ammonia to a watery solution of opium, that a grayish, flocculent precipitate takes place if the fluid be cold, and a granulated one when the solution is hot; this is impure morphia. Before purifying by crystallisation, it is usual to macerate in cold diluted alcohol, to free it from the colouring matter. According to the process of M. Robiquet, the *magnesian precipitate*, containing the morphia, is also subjected to a maceration in alcohol; these are what I term the alcoholic mother waters; liquids that are always neglected, yet they merit attention.

I took them after they had deposited all the morphia and narcotine that would spontaneously separate, saturated them with hydrochloric acid, and subjected them to evaporation; by this means I obtained a crystalline mass, which afforded me much morphia, and some codeine, which I separated by ammonia and potash. I shall not dwell on the steps of this process, as they have heretofore been explained, and will only remark with regard to the codeine, that it is extraordinary to discover it in morphia *precipitated by ammonia*; I have often observed, that if the ammonia does not precipitate pure codeine from its acid solutions, and particularly from its solution in hydrochloric acid, the partial precipitation of a certain quantity of it will take place under peculiar circumstances, and that it is often carried down with the morphia; I have found that ammonia will always precipitate codeine from its solution in acetic acid. I may here also mention a substance which will be more particularly spoken of hereafter, under the name of *Paramorphia*, a substance I obtained by treating opium with lime. This substance, which cannot be confounded with codeine on account of its insolubility in potash, accompanies the morphia in these mother waters, and is precipitated with

it, when ammonia is added; but can be readily separated by means of ether or weak alcohol, which readily dissolve it.

I sought in vain for meconine in the precipitate by ammonia. M. Couerbe states that he has found it; perhaps I washed the precipitate too much before macerating it in the alcohol; when it is present, it is to be separated by converting the precipitate into hydrochlorates, and treating with ether, the salifiable bases of opium not being soluble in this fluid in the state of hydrochlorates.

In another experiment, I treated the crude morphia with sulphuric ether, and obtained narcotine, morphia, codeine and paramorphia.

V.

Examination of the substance found by M. Dublanc, and described, Annales de Phys. et Chim. XLIX. I.

In a memoir on opium, published in 1832, but read in 1826 before the Royal Academy of Medicine, M. Dublanc, jr. announced the discovery of a new substance which was crystalline, and soluble in both alcohol and water. M. Couerbe regarded this substance as identical with one detected by himself, whilst working in my laboratory, and thus consented to share the honour of the discovery of meconine with M. Dublanc. Since that period, however, I have entertained some doubts whether the substance of M. Dublanc really was meconine. This gentleman states that it contains azote, that it differs from narcotine by containing more hydrogen and less carbon, that it affords ammoniacal products on distillation; now, meconine does not contain azote, it is volatile; M. Dublanc who heated his substance in a tube, found that it did not volatilize, neither was any change of colour produced on the addition of sulphuric acid, a change which is so characteristic of meconine; in fact, his description of its properties more nearly allies it to codeine. However, he has not shown whether it was alkaline, or formed salts; it differs also from codeine in the form of its crystals and its solubility. What, therefore, is this substance?

To decide the question I repeated the process of this chemist, and implicitly followed the method he employed to obtain his crystalline matter. M. Dublanc evaporated the ammoniacal mother waters of morphia, dissolved the residue in alcohol, obtained an alcoholic extract, treated this extract with ether, evaporated the solution, obtained an acid matter, dissolved it in water, saturated the acid with *sub carbonate of soda*, and procured two distinct substances, one white and granular, the other brown, which he removed by very cold and weak alcohol, used in small quantities, and finally purified the white substance by dissolving it in alcohol and crystallising it.

By acting in this mode, I obtained a crystalline substance which did not appear to me to be homogenous, I therefore somewhat modified the operation; the matter left on the evaporation of the ether, was dissolved in water and purified by animal charcoal; the fluid which was *acid* was slightly evaporated, and suffered to stand for twenty-four hours in a cool place. It afforded crystals which were evidently meconine; having separated these, I added carbonate of soda, and thus procured a granular precipitate, which when purified, gave me crystals having all the characters of codeine.

It is therefore highly probable that the substance described by M. Dublanc was a mixture of meconine and codeine, which will explain its peculiar properties and actions.

VI.

Researches on the extraction of Morphia by means of Lime.

Paramorphia.

Oxide of calcium (lime) is often employed to obtain the vegetable alkalies; in some cases even, lime is to be preferred to the more energetic alkalies, as potash, soda, or ammonia, for these salifiable bases often retain a portion of the vegetable alkalies in solution, and exercise an action which tends to modify or alter them. Being anxious to ascertain if lime might not be advantageously substituted for ammonia in the extraction of morphia, I determined to make a trial on a large

scale. Five kilogrammes of opium were selected for this purpose, and the operation confided to M. Thiboumery, the head of my establishment.

A solution of this opium was well filtered and treated with milk of lime; the precipitate that ensued was washed with pure water, till it came away colourless. The calcareous residue was dried in a stove, and treated with boiling alcohol; but to my great surprise, no morphia was afforded either by the cooling of the alcohol or by its evaporation. Astonished at this result, we examined the washings, and found that they contained much more lime and were much more alkaline than common lime water, and moreover that they contained morphia. To separate the morphia, they were saturated with hydrochloric acid, when on the addition of ammonia, very pure morphia was obtained. Not being satisfied with this, and desirous of ascertaining the nature of the substances dissolved in the alcohol; this was evaporated, giving a granulated, brown mass; this, treated with ether, was partly dissolved, leaving a large proportion of a black extractive matter; the ether on spontaneous evaporation, afforded a brown crystalline mass which adhered to the sides of the vessel. This substance was rendered purer and whiter by dissolving it in an acid, precipitating by ammonia and recrystallising in alcohol or ether. This is the substance I have called *Paramorphia*, because it presents a complete analogy in composition with morphia; though it appears perfectly distinct from that alkaloid.

Paramorphia is white, scarcely soluble in water, of an acrid and styptic rather than a bitter taste. It is very soluble in alcohol and ether, even when cold, and still more so when aided by heat; in the latter case, very little of it separates on cooling. By spontaneous evaporation, it crystallises in needle-like crystals.

The weak acids dissolve it; the alkalies precipitate it from its solutions; an excess of alkali does not redissolve it, except the alkaline solution is much concentrated; its acid solutions never afford crystals; on evaporation yellowish scales only are obtained. It melts at 150° C., is not volatilised at a higher

temperature, but becomes decomposed like the vegetable alkalies.

Paramorphia differs from morphia in not being reddened by nitric acid, by not forming crystallisable salts with the acids, and not striking a blue colour with the salts of iron.

Paramorphia resembles codeine in its solubility in alcohol and ether, in its alkalinity; but differs in never forming large crystals, in not forming crystalline salts, and in always being precipitated from its acid solutions by ammonia; finally, in not melting and forming oily drops.

Paramorphia has no analogy with meconine and narceine. The only substance with which it might be confounded is narcotine; and, in fact, they cannot be distinguished without the closest attention is paid to their differential characters. There are none of those marked points of dissimilarity, either in their external appearance or chemical reactions, so useful in the discrimination of bodies. At the same time the difference of taste, fusibility, solubility in alcohol, are sufficient to separate those two products.

Narcotine crystallises in prismatic needles of a remarkable brilliancy, paramorphia in granulated crystals, or very short needles; narcotine has a purely bitter taste, paramorphia a bitter taste also, but leaving a styptic and metallic impression on the mouth; narcotine requires about 100 parts of cold or 25 of hot alcohol to dissolve it, and always crystallises on the cooling of a saturated solution; paramorphia is soluble in 10 parts of cold alcohol, and in a much less quantity of boiling. The action of concentrated acids on paramorphia, has not been thoroughly examined, but enough has been ascertained to distinguish it from narcotine. Nitric acid poured on narcotine almost instantly dissolves it, becoming of a beautiful yellow colour; when it is added to paramorphia, this latter becomes yellow, but not of so decided a tint as narcotine; it softens, and melts, as it were, before it is dissolved. Hydrochloric acid also converts paramorphia into a soft and resinoid substance, before dissolving it.

Two years since, I made an analysis of it, assisted by M.

Couerbe, and have lately repeated it, with precisely the same results as regarded the carbon and hydrogen, but obtained rather less nitrogen.

<i>Paramorphia.</i>		<i>Morphia, (LIEBIG.)</i>
Carbon	71,310	72,20 = 2 atoms.
Hydrogen	6,290	6,24 = 36 “
Nitrogen	4,408	4,92 = 2 “
Oxygen	17,992	16,66 = 6 “

The analyses of morphia by different able chemists differ much more from each other in their results than the above.

As paramorphia does not form crystallisable salts with the acids ; it has not been possible for us to determine its capacity of saturation, which would have thrown much light on the subject.

As it would be very interesting to ascertain the action of paramorphia on the animal economy, I transmitted some to M. Majendie, who kindly undertook a series of experiments with it.

VII.

Analysis of Opium collected in France.

The presence of morphia in the capsules of the poppy raised in France, has lately been announced. M. Tilloy, of Dijon, and M. Petit, of Corbeil, have both given interesting notices of this fact ; but few have attempted to obtain opium. That of which I am about to give the analysis, came from the estate of General Lamarque, at Eyres in the Department of Landes.

This opium is not an extract made from the capsules, it is the juice derived from incisions, and dried in the open air. Sometime before his death, General Lamarque transmitted a specimen to M. Caventou, who was kind enough to present it to me.

This opium is of a very dark reddish brown colour, when dry it is brittle, its taste resembles that of Smyrna opium; on solution it leaves less residue than the Asiatic opiums.

Sixty grammes were dissolved in distilled water; the small

insoluble residue on being examined, was found to be composed of the usual constituents, except that there was *no trace of narcotine*; the caoutchouc was in less proportion than in Smyrna opium. The watery solution was heated to 100 C. and precipitated with sub-carbonate of ammonia. The granular precipitate was washed, dried and then treated with sulphuric ether. The ethereal tinctures on being evaporated, afforded a slight layer of an oily substance, *but no narcotine*. The precipitate was then dissolved in boiling alcohol, and purified by means of animal charcoal; on cooling, it afforded 5.39 grammes of beautifully crystallised morphia.

The ammoniacal mother waters were then boiled, and treated with hydrochlorate of lime; a precipitate took place formed of carbonate and meconate of lime. This precipitate treated by an excess of hot but not boiling hydrochloric acid, was dissolved, and on the cooling of the solution gave 2.25 grammes crystallised bi-meconate of lime. The mother water of the first precipitate on being evaporated presented a crystalline mass which was partly soluble in alcohol, the insoluble portion proved to be sulphate of lime, whilst the soluble was formed almost entirely of hydrochlorate of morphia, representing 0.78 grammes of this base. I paid particular attention to this hydrochlorate, and endeavoured to discover in it, those principles always to be met in Turkey opium, viz. narceine, meconine, codeine and paramorphia; with the exception of codeine I was unable to detect them; this may have arisen from my having operated on too small a quantity; I had at the same time evident traces of codeine.

The formation of a marked quantity of sulphate of lime on the addition of the hydrochlorate of this base, would seem to indicate that in French opium, the morphia is in part united with sulphuric acid, as has been noticed by M. Dupuis in Turkey opium. If I had possessed more of this opium I would have pursued my researches still farther; but at the same time several interesting facts are deducible from what has been done: It has been seen that French opium is richer in morphia than Turkey opium, as 60 grammes gave 6.17

grammes of pure morphia, whilst a comparative analysis of the same quantity of Smyrna opium only afforded 4.25 grammes of the alkaloid. Five hundred grammes or one pound would therefore afford 51 grammes or about 12 drachms of morphia, whilst the same quantity of Smyrna opium would only give 40 to 45 grammes or about 9 drachms. The French opium is therefore richer in morphia than the Turkey, but contains no narcotine.

As however, the presence of narcotine in opium is rather an inconvenience than an advantage, this absence of it renders the French opium more valuable. Although I ascertained the presence of codeine in our native opium, I was unable to determine the proportion in which it occurred.

As the *Papaver somniferum* and *P. orientale* grow perfectly well in France, even in poor soil, their seeds being used in large quantities in the manufacture of poppy oil, this notice may induce cultivators to turn their attention to the subject of opium, and thus open a new field of industry.

VIII.

Facts respecting Narceine.

We have already given, what we consider as the best process for obtaining narceine, but to have it perfectly pure, it must be dissolved in a very weak solution of caustic potash, at nearly a boiling heat, the solution filtered, and a slight excess of acetic acid added; the narceine crystallises on cooling, and the morphia, if any be present, remains in solution in the acid liquid.

In my first memoir I considered narceine to be an organic alkali. But the above experiments and many others of a similar character have proved to me that although acids favour its solution, they are never saturated by it. When crystallisation takes place in an acid solution of narceine, the crystals are found to be pure narceine.

I have said that the mineral acids of a certain strength, (but not so powerful as to destroy it,) strike a blue colour with narceine; I have since ascertained that this blue colour is mainly dependant on the quantity of water combined with the nar-

ceine. Thus, if a current of dry hydrochloric acid gas is passed through narceine, this substance will absorb the acid, and become of an orange yellow colour; if a little water be added it will assume a beautiful blue tint; a larger quantity of water will dissolve it, and the colour will disappear, and if the acid be now saturated with a few drops of ammonia, the narceine will be precipitated in an unaltered state.

Iodine combines with narceine; this combination is of so deep a blue that it appears black, but if it be mixed with some inert white substance, it becomes of a magnificent shade of blue. It is a real combination; if water be added and the mixture boiled, it dissolves without colouring the liquid; on filtering it promptly, the narceine separates of either a blue or a rose colour, in the latter case retaining less iodine. Finally, if the boiling be continued, the narceine crystallises of its original colour, retaining no iodine, which remains in the fluid. The rose coloured combination, which may be termed a sub-ioduret of narceine, may be procured by taking the blue ioduret, and macerating it in a solution of bicarbonate of potash. If the carbonate or caustic potash be employed, the whole of the iodine will be taken up. Hitherto starch was the only substance which struck a blue colour with iodine. It is remarkable that a substance so different from starch in its nature and properties, should produce an analogous result. This fact should induce us not to place exclusive reliance on the use of reagents in determining the nature of a substance.

The action of bromine, and especially of chlorine on narceine, is more complicated; and I shall refrain from speaking of it, until I shall be enabled to publish the researches I have undertaken on the actions of halogene bodies on vegetable substances, and particularly on the vegetable alkalies.

IX.

Note on pseudo-morphia, followed by some considerations on the detection of morphia by reagents.

I give the name of pseudo-morphia to a singular substance I obtained from opium, treated on a large scale, without my

being able to assign a reason. I have only succeeded in procuring it three times. Is this substance the result of a reaction of various agents on morphia or narcotine, the two products of opium to which it bears the greatest analogy? I do not think so; at least I have never been able to form it from those two bodies. Is it owing to some other vegetable juice mixed with that of the poppy, in the country in which the opium was collected? This, I am of opinion, is still more unlikely; for the resemblances in nature and properties between this substance and morphia, would seem to indicate that one is formed from the other, either naturally or from some disease of the plant. Be this as it may, the quantity of this substance I have obtained at different times, has permitted me to study it closely, and to describe it in such a manner, that it can never be mistaken.

Some varieties of opium, on precipitation by ammonia from their solution in water, furnish a morphia mixed with much narcotine; this morphia, even when rendered white by several crystallisations, still retains narcotine, if not treated in a particular manner. It was from a morphia thus mixed with narcotine, that the substance under consideration was obtained in my laboratory. After having treated the morphia by a solution of caustic potash to dissolve it, and to leave the narcotine, the solution was saturated with sulphuric acid, and the morphia precipitated by ammonia; after filtration, the fluid, which was slightly acid, was evaporated, when it precipitated a whitish, micaceous substance; this was collected on a filter, and washed with distilled water. To render it more pure, it was re-dissolved in boiling water; on cooling, it crystallised in micaceous scales; the mother water retained a little sulphate of soda. In this state, cold water at 14 C. dissolved only 0.0013 of its weight, and boiling water 0.008, which crystallised on cooling. If a little ammonia be added to the boiling solution, this substance loses its pearly lustre, becomes less soluble and parts with $\frac{8}{100}$ of sulphuric acid.

This substance, as has been shown, is almost insoluble in water. It is still less so in absolute alcohol and in ether;

alcohol at 36° B. dissolves a large proportion; aqua ammonia has very little effect upon it, but the solutions of potash and soda dissolve a large quantity; on saturating these solutions with an acid the substance is precipitated, but retains a little of the acid; the diluted acids somewhat aid its solution, but present considerable differences in this respect; thus, sulphuric and nitric have little influence, hydrochloric more, and acetic a still greater. Concentrated sulphuric acid gives it a brown colour, and alters its properties; concentrated nitric acid produces the same action as on morphia, giving it an intense red colour, and finally changing it into oxalic. But the most singular property of this substance, is, that it becomes of an intense blue colour with the per salts of iron, and especially the hydrochlorate of the peroxide; it is also remarkable that this colour disappears on the addition of an acid. The affinity of this substance for iron is so great, that whilst it resists the solvent power of sulphuric acid, and is only slightly soluble in hydrochloric acid; the hydrochlorate of the peroxide of iron dissolves it freely; the solution is of a bright blue; when heated, it becomes of a dirty green; if ammonia be added, a slight precipitate takes place, and the fluid assumes the colour of red wine. Somewhat the same phenomena occur, when morphia is treated in a similar manner.

In making comparative experiments on morphia and this new substance, I was enabled to elucidate some points connected with toxicological researches of great interest. First, the discovery of a substance which enjoys two of the most characteristic properties of morphia, and yet which *is not poisonous*, namely, that of becoming red with nitric acid, and that of striking a blue colour with the salts of iron, should render toxicologists very circumspect, as even when they find these characters, they ought not to positively assert that morphia is present; to do which, as in cases of other poisons, the substance should be obtained in an isolated state. I will also add, that the absence of these phenomena should not prevent the experimenter from pursuing his researches, as circumstances may prevent their manifestation. In fact, I have re-

marked that some of the combinations of morphia, as the hydrochlorate, and the acid sulphate, were scarcely tinged of a blue colour on the addition of the hydrochlorate of the peroxide of iron, especially when this contains an excess of acid. In this case, I place the combination suspected to contain morphia, on a piece of glass, add a drop of ammonia, and permit the fluid to evaporate spontaneously; after this the salt of iron will act on the morphia.

To return to pseudo-morphia; this substance, when heated, is not volatilized, nor is it entirely fused, as it decomposes as it begins to soften; when distilled in a glass retort, it affords a little oil, a small quantity of slightly acid water, from which potash disengages ammonia, and leaves a voluminous charcoal which is totally consumed when heated in the open air.

I analyzed pseudo-morphia with great care, and repeated my experiments several times; in this analysis I was assisted by M. Walter, a young, but able and expert chemist.

The results were:

Carbon,	52.74 = atoms	54
Hydrogen,	5.81	36
Nitrogen,	4.08	2
Oxygen,	37.37	14

By calculation:

Carbon, atoms	54 =	2066.74 =	53.41
Hydrogen,	36	225.00	5.81
Nitrogen,	2	117.64	4.57
Oxygen,	14	1400.00	36.19

On referring to the analysis of morphia already given, it will be seen how far pseudo-morphia differs from that substance.

Being anxious to ascertain its action on the animal economy, I sent a portion to M. Majendie, and also myself administered half a gramme to a rabbit, which did not appear to be affected by it.

If pseudo-morphia is not morphia, may it not be some combination of this base, (which, however, I do not believe) in which it loses all its poisonous properties?

P. S. My memoir had already been presented to the Academy of Sciences, when that of M. Couerbe, partly on the same subject, appeared in the *Annales de la Physique et Chimie*. I therefore determined to print mine, without alteration. I shall not enter into a discussion with M. Couerbe on the few points on which we differ; these slight differences are almost inevitable. One passage, however, requires notice; M. Couerbe attributes the discovery of Paramorphia to M. Thiboumery, forgetting that at this time I was engaged in a series of researches on the constituents of opium, which were directed by M. Thiboumery with great sagacity, but always in concert with me, and according to my orders. M. Couerbe also forgets that before either he or I, (I am uncertain which, for M. Couerbe was at that time in my laboratory,) thought of passing a current of carbonic acid through the lime-water containing morphia, I had ascertained that morphia really existed in this solution, and could be precipitated by ammonia, if the liquid was previously acidulated with hydrochloric acid.

I am ignorant why M. Couerbe has given the name of Thebaine to paramorphia; this name would seem to indicate that this substance is only met with in Egyptian opium, whilst Turkey opium contains it in the largest proportion. At the same time, I am indebted to M. Couerbe for his having verified my discovery of two new substances in opium—narceine and paramorphia, and for having added many interesting facts to the history of this latter substance, which appears to play an important part in the action which opium exercises on the system. In fact, hitherto it has been difficult to account for the excitement produced by opium in conjunction with its other effects, as it could not be attributed to narcotine, morphia, or codeine. From the following communication from M. Majendie it would appear to be owing to paramorphia.

“I have experimented with your two substances; pseudo

morphia appears to exert no action on the animal economy. This is not the case with paramorphia, which acts *tetanically* in doses of a grain. It is difficult to distinguish it in this respect from brucia, or even strychnia; though I have not compared its relative activity with these two substances. It *tetanizes* and kills dogs in a very short time when injected into the jugular vein or pleura, in doses of a grain. I do not, therefore, see any benefit in the new substances as remedies, though the analogy of the physiological action of paramorphia with that of strychnia, merits attention."

It follows from the above:

1st. That there can be no doubt of the existence of the two new principles discovered by me in opium,—narceine and paramorphia.

2d. That the codeine detected by M. Robiquet is not the result of a reaction; that from the same portion of opium, we may obtain narcotine, morphia, narceine, meconine, codeine and paramorphia.

3d. That paramorphia is one of the most active principles of opium.

4th. That the crystalline substance described by M. Dublanc is a mixture of codeine and meconine.

5th. That pseudo-morphia is a substance sometimes to be met with in opium, but that at present we are ignorant under what circumstances it is produced.

6th. That the French opium, collected in the Department of Landes, is richer in morphia than Turkey opium; that it also contains codeine, but is destitute of narcotine.

Journ. de Pharm. Nov. 1835.

MISCELLANY.

Adulteration of Musk.—Mr. Periera, in his lectures on *Materia Medica*, states that at the present time, musk is not much adulterated, though sand, stones, &c. are sometimes found in it. He also thinks that where musk pods show the marks of having been sewed, that this has been done to prevent the loss of the musk, rather than to close an aperture which had been made for the purpose of introducing impurities.

One of the best tests for genuine musk is, that an infusion of it does not precipitate a solution of corrosive sublimate. Both Berzelius and Geiger lay great stress on this test. Dr. A. T. Thomson, however, asserts exactly the reverse of this. Other tests for the purity of this article, are, the precipitation of an infusion of genuine musk by the acids, especially the nitric; by sugar of lead and infusion of galls.

London Med. Gaz. Dec. 1835.

Essence of Musk.—Take of grain musk fourteen drachms, or of the membranes of the musk pods, seven ounces; boiling water half a pint. Digest until cold, then add rectified spirit of wine, six and a half pints; sub-carbonate of potash, half a drachm. *Ibid.*

Caoutchouc.—At the meeting of the British Association, 1835, Dr. Dalton stated the results of his examination of the spirit distilled from caoutchouc. He found it to depress the barometer like sulphuric ether. It passes through water without diminishing its volume; thus differing from ether. It is absorbed by water like olefiant gas. It consists of 2, olefiant gas; 10 volumes, when burned, give 40 carbonic acid, and require 60 of oxygen.

Edin. New Philos. Journ. Oct. 1835.

Compounds of Tin and Platinum.—At the same meeting, Mr. Kane described two compounds of tin and platinum, formed by the action of protochloride of tin on a solution of platinum. One of these compounds consists of an atom of each chloride. It deliquesces in the air; it is a dark solid substance when anhydrous, and when allowed to remain in the air is converted into an olive liquor, which is resolved into the oxides by the action of water. The author also suggested that tin is a good test for platinum. *Ibid.*

Nicotine.—Mr. Davy described some experiments made by him in reference to the relative values of Virginian and Irish tobacco. He procured nicotine by simply digesting the leaves in potash, and then distilling. A liquid possessing uniform qualities passed over. This liquid, when acted upon by acids, afforded salts having a sharp, biting taste. The effects of this liquid on animals were those of a powerful narcotic. He found that one pound of Virginian tobacco was equivalent to two and one-third of Irish; the root containing four or five per cent. of nicotine.

Ibid.

Corrosion of Lead Pipes.—Mr. Moor mentioned a curious fact in reference to the corrosion of lead pipes. The worm of a still used for preparing medicated waters, was exhibited, which was corroded completely through its substance, at points where it had been supported with wood and tied with twine. At these places a black substance was formed, consisting of oxide and chloride of lead. It was obvious that the effect was to be attributed to galvanic action.

Ibid.

Per oxide of Iron.—Dr. Barker advises the separation of this by means of acetate of potash. This salt, when added to a solution of a per salt of iron, precipitates the per oxide when this liquid is boiled. It would, he thinks, be an excellent mode of separating iron from manganese.

Ibid.

Hydrocyanic Acid.—Dr. Geoghehan has suggested the advantage of employing the double salt of iodide of potassium and bichyanide of mercury, for the purpose of detecting hydrochloric acid in hydrocyanic acid. Sulphuric acid is frequently met with in hydrocyanic acid, but the distinction between these two acids is readily made by means of nitrate of barytes. The peroxide of mercury, usually employed for testing the purity of hydrocyanic acid, is ambiguous in its action, as it is generally impure. The use of this salt is not applicable to the alcoholic hydrocyanic acid.

Ibid.

Ferro-cyanate of Quinia.—M. Bertazzi has given the following process for obtaining this salt. Take one part of sulphate of quinia, which is to be triturated in a glass mortar, so as to reduce it to a very fine powder; then add this to one part and a half of ferro-cyanate of potassa dissolved in seven parts of boiling water; after they have been well mixed, pour the compound into a vial, and expose it to a sufficient heat to cause ebullition, shaking it from time to time. The solution lets fall a substance of a greenish yellow colour, and of an oily consistence. After decanting the fluid, this precipitate is to be well washed in distilled water, and then dissolved in concentrated alcohol, and subjected to a heat of about 100° F.,

then filtered and slowly evaporated; this will afford a crystalline mass, corresponding to three-fourths of the quinia employed. When dried, it is of a greenish yellow colour, and very bitter taste, first giving the sensation of quinia, and then of hydrocyanic acid. It is partially decomposed by cold water, and completely so by hot; it then forms two salts, the one soluble, the other insoluble. It is very soluble in boiling alcohol.

Annali universali de Med.

Biniodide of Mercury.—Dr. Inglis says that the biniodide falls in the form of a rich red powder when solutions of the bichloride of mercury and hydriodate of potassa are mixed together, and in this form it is generally seen. He has, however, he states, procured it in pretty large crystalline cubes, by the following process. He found that it was dissolved in great abundance in a boiling solution of hydriodate of zinc. He therefore added the biniodide till no more could be taken up, and then placed the saturated solution under the exhausted receiver of an air pump; in a short time the biniodide began to be deposited, and soon assumed the form of large regular cubes. The hydriodate of zinc that remained was capable of dissolving a fresh quantity of biniodide, or of re-dissolving that which was crystallised from it; the crystals contain no zinc.

Lond. & Edin. Philos. Mag. Jan. 1836.

Ointment for the cure of Itch.—Dr. Emery highly extols the following ointment in the treatment of itch. Take of brown soap one ounce, table salt half an ounce, sulphur half an ounce, alcohol one drachm, vinegar two drachms, chloride of lime half a drachm. One-fourth to be used in friction morning and evening. It has the advantage of never causing any accidents or anomalous eruptions; of not soiling the clothes; of not being unpleasant; of curing the disease in a short time, and of being very cheap.

Amer. Journ. Med. Sci. & Bull. Gen. de Therap.

Ointment for enlarged Tonsils.—Dr. Cerchiari considers the following ointment as very efficacious in the cure of enlarged tonsils. R Iodin. pur. ℥i, ung. Rosar. ℥i. M. To be applied to the tonsils morning and evening, by means of a small brush. By the end of two months these glands will, he asserts, under this application, return to their normal size. It is necessary that the inflammation should be entirely subdued before recourse is had to this ointment.

Ibid and Journ. de Conn. Med. Prac.

Lacker for Tin.—Take eight ounces of amber, two ounces of gum lac, melt them in separate vessels, and mix them well together; then add half a pound of drying linseed oil. Into a pint vial put half a pint of spirits of turpentine, and digest in it a little saffron; when the colour is

extracted, strain the solution and add finely powdered gum tragacanth and annatto, in small quantities at a time, till the required shade of colour is produced; mix this colouring matter with the melted resins, and agitate well till a perfect union takes place. If this varnish be laid over silver leaf or tinfoil, it will be difficult to distinguish it by the eye from gold. It is applicable to leather, paper, or wood; also to tin-plate articles.

Mechanics' Mag.

Beet Sugar in France.—A hectare of land (nearly $2\frac{1}{2}$ acres) sown with beets, produces, on an average, 2,400 kilogrammes of roots, or about 47 cwt. 36 lbs., and there are many instances where a single grower raises from 80,000 to 90,000 kilogrammes (6,260 to 7,098 cwt.) The cultivation costs about 8 shillings (\$1 75) the 100 kilogrammes (20 cwt.) The quantity of sugar extracted by the present process is about seven or eight parts of saccharine matter from 100 parts raw root.

Arcana of Science, 1835.

Pomatum to prevent the hair from falling off.—The following preparation, which was recommended by Dupuytren, is said to be very effectual in preventing the loss of hair. Macerate a drachm of powdered cantharides in an ounce of spirits of wine, and filter. Ten parts of this tincture are to be well incorporated with ninety parts of lard.

American Journ. Med. Sci.

Acetum Opii Sedativum.—Mr. Horne has recommended the following formula for the preparation of this article. Take three times the quantity of the best opium, reduced to fine powder, that is ordered by the London Pharmacopœia for two pints of tincture; add to the opium two pints of dilute acetic acid; after they have digested a few hours, add to them six or eight pints of rectified spirits of wine, macerate about seven days, then carefully filter in order to separate the insoluble parts of the opium. Introduce the liquor into a retort accurately closed and distil off the spirit. The product in the retort will be the *acetum opii*. If the distillation be carefully conducted, the result will always prove of one uniform strength; one \mathfrak{m} being equivalent to three \mathfrak{m} of tinctura opii, and free from spirit, and will keep unchangeably for a length of time. It will be found the same, or very similar to Mr. Battley's *Liq. opii sedativus*, (except the strength, which latter falls short, according to the opinion of our most able experimenters, as nearly 1 to 2, instead of 1 to 3,) a preparation too well known to require describing, except in regard to its mode of formation, which the preparer, in spite of his ranking as a scientific druggist, has hitherto kept a profound secret.

The rationale of this process may be briefly stated as follows: The acetic acid unites with the morphia of the opium, and forms an acetate

of morphia, which is held in solution by the diluted acid; the remaining ingredients of the opium, acted upon by the spirits of wine are extracted, and detained by the acid, after the spirit has been distilled off.

Ibid, and London Med. Gaz.

Purgative for children.—

R	Ol. Tigllii	gtts. ij.
	Sacch. alb.	ʒij.
	Gum Arab.	ʒss.
	Tinc. Cardam.	f. ʒss.
	Aqua distill.	ʒi. ʒij. M.

This mixture is to be administered in doses of two desert spoonfuls, every three or four hours, till the bowels are sufficiently acted upon. It is of an agreeable taste, and may be advantageously given to the youngest children; but of course in diminished doses, according to the age.

Journ. de Pharm.

Brilliant white light for Signals.—

Nitre,	24 parts,
Flowers of Sulphur,	7 parts,
Red sulphuret of arsenic,	2 parts,

These substances are to be thoroughly incorporated, and pressed lightly into boxes of six inches in diameter, by three in height; the flame lasts for three minutes. It can be seen at a distance of 30 or 40 miles.

Ibid.

Castoreum.—Mr. Pereira states that the following are the principal differences between American and Russian Castor. In the latter, the sacs are smaller and more rounded than in the former; they are also compressed. Colour, ash brown. Odour, remarkable and peculiar, differing from the American. It is empyreumatic, or like that of Russian leather. Internal appearance, brownish fawn, and quite dull, with no shining or resinous lustre. American castor softens under the teeth like wax, and has an acrid taste; whereas Russian breaks down like starch, has but little taste at first, and then becomes somewhat bitter and aromatic. One of the best discriminating tests, is to drop a piece about the size of a pea into diluted muriatic acid; no obvious effect is produced on the American, whereas the Russian effervesces. The tincture of the Russian is of the colour of dark Sherry wine, whilst that made with the American is nearly as dark as London porter. When added to water, the former produces but a slight milkiness, scarcely altered by aqua ammonia; the latter renders the water very milky and strikes a bright yellow with ammonia.

London Med. Gaz.

Chloruret of Lime in Gonorrhœa.—Professor Graefe, of Berlin, states that he has succeeded with this article where copaiba and cubeba have failed. He used it in pills and injection. The pills are made as follows:

R Chlor. calc. ʒi.
 Extr. opii, gr. ix.
 Mucilag. Gum Arab. q. s.

Of this, fifty four pills are to be made. At first, one is to be taken every two or three hours, and the dose gradually increased till eight, ten, or twelve are taken every hour. The injection is made by dissolving gr. xxiv. in water ʒvj., adding vin. opii ʒss.

Trav. Soc. Med. Bourdeaux and Amer. Journ. Med. Sci.

Indigo in Epilepsy.—Dr. Ideler, of Berlin, asserts that he has obtained beneficial results from the administration of powdered indigo in epilepsy. He administers it in the following manner:

R Powdered indigo, ʒss.
 Aromatic powder, ʒss.
 Syrup, q. s. to make an electuary.

This is at first to be taken in two days, and afterwards in one. The dose of indigo may be increased to six or eight drachms a day. According to the author, the first effects of the remedy are nausea and vomiting; sometimes it produces a diarrhœa, which soon ceases, and is followed by constipation; the urine becomes of a brown colour.

Journ. de Chim. Med.

Gallic Acid.—Dobereiner says that gallic acid may be rapidly prepared by mixing a concentrated decoction of nutgalls with a little acetic acid, to decompose the gallate of lime, agitating with ether, which takes up most of the gallic acid, evaporating this solution to obtain the gallic acid, which is thus procured in a very short time, in the form of small colourless prisms.

Pharm. Tech. Rath.

Mode of detecting some Organic Acids.—H. Rose has discovered that tartaric, paratartaric, citric and malic acids may be readily detected in the following manner: they are to be dissolved in as small a quantity of water as possible; to this solution an excess of completely saturated lime water is to be added.

Tartaric and paratartaric acids form precipitates in the cold state. That produced by tartaric dissolves completely in a small portion of solution of ammonia, whilst the paratartaric remains insoluble. Both acids are readily distinguishable by treating their solution with sulphate of lime; after some time lime is deposited in that of paratartaric, whilst that of tartaric is not affected.

A solution of citric acid yields no precipitate with lime water in a cold

state, but when heated, a copious deposit takes place. If a small quantity of a very dilute solution of citric acid is mixed with lime water, a precipitate takes on boiling the mixture, and is again taken up as the liquid cools.

A solution of malic acid occasions no precipitate with lime water, either in a hot or cold state. *Dublin Journ. Med. and Chem. Sci.*

Lotion for pustular eruptions on the face.—Dr. Siemerling advises the following as useful in pustular eruptions on the forehead and face:

R Sweet almonds, $\bar{3}j$.

Bitter “ $\bar{3}iv$.

Make an emulsion with distilled cherry water, (*Kirshenwasser*;) $\bar{3}x$.—add

Corrosive sublimate, gr. vj.

Tincture of benzoin, $\bar{3}vj$.

Lemon juice, $\bar{3}iv$.

Whenever the eruption is washed, the lotion must be well shaken.

Journ. de Pharm.

Anti-syphilitic solution.—Dr. Werneck has found the following very prompt and effectual in the cure of recent cases of syphilis:

R Deuto-bromide of mercury gr. i.

Sulphuric ether $\bar{3}i$.

The dose of this solution is 10 to 20 drops in barley water, a short time after taking dinner. A solution of the deuto-bromide of mercury in distilled water (6 grs. to the pint of water) forms a good wash for chancres. When the ethereal solution is employed internally, the strictest attention must be paid to the diet. *Ibid.*

Crystallised Barium.—P. Muratori states that crystallised barium may be readily obtained, by passing a stream of ammoniacal gas through a solution of hydrochlorate of barytes, until the water of the solution is saturated; the hydrochlorate is decomposed, and the barium is deposited in a crystallised state. He adds, that by the same process calcium may be also obtained in a crystallised form. *Journ. de Chim. Med.*

Deliquescent Salts.—Mr. Druchar recommends to pour a few drops of oil of turpentine in the bottle in which they are to be kept, and the crystals introduced after the air has been thoroughly impregnated with the vapour. *Ibid.*

Aromatic honey of roses.—

R Petals of red roses, 3 lbs.

Rose water, 16 lbs.

Place the whole in a still, and apply heat; continue the process till 12

ounces of a very aromatic fluid have passed over. Take the residue, strain it through a flannel and express; then filter through paper. This filtered liquid is to be mixed in a basin with ten pounds of well clarified syrup of honey, and the whole boiled till it marks 31° of the hydrometer for syrups, when it is to be withdrawn from the fire, and the 12 ounces of liquid obtained by distillation added to it; the mixture is to be again strained. This is an excellent preparation, very astringent, of a fine red colour, and perfectly transparent. *Journ. de Chim. Med.*

Opiate for Gonorrhœa.—Dr. Berton gives the following formula as very effectual in the treatment of Gonorrhœa.

R	Bals. copaibæ,	
	Pulv. Cubebæ,	aa ʒij.
	Alumenis	ʒi.
	Extract opii,	gr. v.

Incorporate the whole carefully, so as to form a homogenous mass. Of this, one drachm is to be taken night and morning in the pulp of a prune, and the dose rapidly increased to two drachms, morning and evening. The author disapproves of injections, till the running has diminished and the disease remains in a stationary state. *Gazette Med.*

Creosote Pills.—Dr. Reich, of Berlin, has found the following pills very beneficial in acute rheumatism. R Creosote, ʒi; Pulv. Rad. altheæ, q. s. f. pill. ex. Four or five to be taken morning and evening. *Amer. Journ. Med. Sci. and Hufeland Journal.*